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The Proposed London Technical High School.

A GREAT deal of excitement has lately been created by the proposal to found a technical high school in London on Continental lines. Lord Rosebery brought the matter forward, but there cannot be the slightest doubt that politics do not enter into the matter. Some opposition has been offered, on the ground that we already have institutions which are capable of doing what the proposed technical high school would attempt to do. We doubt that. For many years we have pointed out the immense advantage to architects, surveyors, and engineers of having an independent place, under Government control, where materials of construction could be tested. If we cannot get Government control, then we must have these tests made by the next best form of control, namely, the County Council or by the Municipality. We do not approach this question in a militant spirit at all, but we think that a consideration of the following facts will thoroughly convince anybody except interested parties.

At present, building stones, bricks, &c., are tested by private individuals, and the results are sent to those who required the information, who in most cases are the manufacturers; and it is perfectly well-known that unless the results are satisfactory to the manufacturers, the information never becomes public property. In this way architects are often misled by statements from interested parties as to their materials, a really good material frequently being passed over because it is asserted (without tests) that the one pushed by the canvasser is better. This may be an old tale, but it holds as good now as ever it did. The architect cannot nowadays be expected to know everything. He has to be guided in regard to his selection of materials he uses in his buildings either by previous experience or by practical tests in reference to new ones. The Yorkshire College at Leeds has for many years provided unimpeachable tests in this direction, and so have the City Guilds Institute and University College; but their accommodation is altogether inadequate for a national means of testing materials of construction.

We hear a good deal of talk about the London polytechnics being able to carry out this important matter. We should like to know where these institutions are. The best known of them has wisely given up "polytechnic" teaching long ago, and confines itself largely to University teaching; another well-known one is giving special prominence to commercial education; a third caters for boys and girls, with a sprinkling of adults; a fourth identifies itself with the teaching of technical education to young artisans, and so on.

We think the promoters of this new high school for technical education made a great mistake when they put forward Charlottenburg as a type of the institution we want. One man pertinently asks whether those who advocate the "Charlottenburg idea" have ever seen the "Technische Hochschule" there, and he asks also whether anybody in this country knows where Charlottenburg is. He is doubtless to some extent justified in his inquiries, and he may be quite sure that hardly anybody here knows much about that establishment. We happen to know it, however, and we think that a great deal too much fuss has been made about it during the past fortnight. Any one would think, from the remarks made, that it was the only place where technical education could be obtained in north-western Europe. We could indicate plenty of places in France, one in particular in connexion with the administration of "Ponts et Chaussées," where most excellent work is carried on. In the United States there are many colleges attached to Universities where practical work relating to architectural and engineering materials is carried on with great advantage. The Cornell University probably stands first in this connexion.

The County Council has been asked by Lord Rosebery to endow this new institution with 20,000*l.* a year. The Council knows its own business, and it is considering the question in a favourable light. But nothing more important, it seems to us, can be aimed at in the utilisation of the technical high school, if it is ever erected, than the making of it into an official testing station for materials of construction. That would provide the students with plenty of material to operate upon; it would ensure that the work was properly carried out; and, above all, the certificates would bear the imprimatur of the authorities of the institution. We do not say that private individuals at present engaged in such work are not doing their work properly—far from it; but the private individual very often has no authority to publish any results he may obtain, whilst a public institution would, or should have, such authority.

What the architect and engineer want is not merely the best results obtained in experimenting with a material: they want all the results, good and bad; and that is what they do not often get under present circumstances. Only the other day we were interviewing a quarry owner, and asked whether he had any "crushing strength" results on his stone. He replied that he had the stone tested some time since, but was not satisfied with the results. Some two or three years ago, another, on being asked why his soft limestone had yielded such extraordinary results, it coming out at about five times the usual strength of stone of the same kind, answered, "Well, I don't mind telling you now, because I am leaving this business. I sent cubes of granite to be tested, and they did not know the difference." Some place where people would know what was sent them to be tested would seem to be highly desirable in such a case. Of course, this is not the fault of the private experimenters, for they do not know, in most cases, what is the object of the experiments, nor is it their business to inquire. It is not for them to return the samples sent, and refuse to perform any tests upon them because the owner of a limestone quarry wants some tests on granite made. The certificate of the tests usually bears something to the following effect: "Received from Mr. So-and-so six cubes of stone marked ——, and we hereby certify the following to be the results." Nothing could be more satisfactory to the

architect; but not so, always, to the person who sent the stone. He only publishes what he likes, as we have already said; and this often renders the experiment nugatory.

The best possible way, it seems to us, would be to get perfectly independent but experienced persons to go to the quarry, brickyard, or what not, to select the specimens to be operated upon in the Technical High School, and to have all the results published in its "Proceedings." That would certainly put a stop to persons playing fast-and-loose with the results supplied to them by perfectly *bonâ-fide* experimenters. We know of one case which occurred not long since, where the proprietor of a quarry produced to a scientific visitor an extraordinary result of the "crushing strength" of his stone. It so happened that the visitor had another result on the same stone in his pocket, arrived at some years previously, and he inquired from the proprietor why there was such a difference, the later result showing a much greater strength. The quarry was not a new one at the time the first experiments were made. The answer was not satisfactory, and the visitor said he should publish both results, and did so, in spite of the fact that the proprietor had previously threatened legal proceeding, which, however, were never initiated. Such facts as these are surely sufficient to warrant the establishment of a national testing station, where the public shall have access to all results arrived at; and it seems that this proposed Technical High School will offer greater advantages for the purpose than any other establishment in London at present.

We have already alluded to the circumstance that the proposed school has been compared with the school at Charlottenburg, near Berlin. The latter establishment is an immense place, and covers considerably more than four acres of ground; the subjects taught are architecture, civil engineering, chemistry, metallurgy, mathematics, physics, mechanical engineering, and ship-building. The work is done in laboratories and class-rooms, there is a research department for testing building materials, oil, metals, and paper, and the work is scientific throughout. The special function of the research department is to institute experiments "in the general scientific and public interest." There is nothing very wonderful about the place, except that the means for original research are, possibly, the best and most complete that money can purchase, and that the professors are men who thoroughly understand their subjects.

It is to be sincerely hoped that more discrimination will be exercised in the selection of students for this new London technical high school than is at present done in connexion with London University classes—for it is proposed to attach the new school to the London University. It is of no use suddenly to bring a raw student to bear upon a technical subject in its highest aspects, as is at present done in many instances. The student, being mentally acute, soon acquires sufficient knowledge to enable him to understand what is going on in the experiments or class-room lectures, and he then pushes ahead as best he can, after asking the professor or his assistants innumerable questions that are merely waste of time so far as most others of the students are concerned. We know of many students, for instance, who try to learn the applications of a science before they know anything at all about the science itself. The result is that all that such a student can obtain, even from the best school, is a smattering of the "applications."

This state of affairs is, doubtless, largely due to the fact that all the colleges attached to the London University which teach technical science are very poor. The bursar or treasurer, as a rule, has more than he can do to make both ends meet, unless he gets extraneous assistance. Therefore, the institution takes in all and sundry, and makes the best of a bad job. Nobody, possibly, regrets this more than the various colleges and institutions themselves, but there is no help for it as things stand. Perhaps this Technical High School, when it is established, will enable people better to understand the extreme impoverishment of existing institutions and colleges. They will then wonder how so much useful work has been done for years past under such adverse circumstances.

However, our main point is that, as at present proposed, the new school is to do a great deal to enable young architects, engineers, and surveyors to learn something of materials of construction—their composition, physical structure, strength, uses, and so forth. They will have to handle the materials themselves, and they will be expected to carry out some original work in reference to them. Whether the money proposed to be expended could not have produced a good result if it were distributed amongst existing schools is not a matter for us to discuss. We are satisfied that progress should be made, and only hope that the new school, when it is in existence, will satisfy the wants of higher technical education, especially in the building arts, in London and the country generally.

VENTILATION OF THE HOUSE OF COMMONS.

In the year 1723 Dr. Desaguliers adopted furnaces for removing vitiated air from the old House of Commons, but the system of ventilation was the subject of complaint for many years, in spite of the attention paid to it by various practical and scientific men. In the year 1836 Dr. Reid introduced a similar arrangement in connexion with the temporary House of Commons, and his apparatus appears to have been a most expensive means of attaining the desired object. After the retirement of Dr. Reid, in 1848, Mr. Goldsworthy Gurney was appointed to superintend the warming and ventilating arrangements of the new House. Considerable alterations were made from time to time. Upward and downward draught were both tried, as also were steam jets, furnaces, and fans for exhaust purposes. Steam batteries, ice banks, and washing screens were provided. From first to last more than half a million sterling was expended in experiments, and, finally, it was thought that the problem was solved.

Such, however, was never the universal opinion of members, and as years passed by, there grew up a settled conviction that the condition of things was far from satisfactory. Ultimately, as our readers are aware, a Select Committee was appointed to inquire into the whole question. This Committee has been laboriously employed for the last fifteen months, and having examined some seventeen witnesses, has now issued a Report which, however, is tentative and generally inconclusive. No other result could reasonably be expected from such a body, and the recommendations made could have been formulated in about a couple of hours by any competent ventilating engineer. We think this view will be found to be justified by perusal of the following summary of the recommendations in question:—

(1) The substitution of electric fans for the existing exhaust furnaces. (2) Simplification of the air inlet duct, and arrangements for its more thorough cleaning. (3) The substitution of modern air-washing screens for the present apparatus. (4) The adoption of improved intake fans. (5) The experimental introduction of air beneath members' seats. (6) More frequent cleaning of the floor matting. (7) Placing all cleaning arrangements under one authority. (8) The appointment of a sanitary officer to superintend the ventilation of the House. (9) The institution of experiments with the view of introducing further improvements in the present system.

From this summary it will be seen that in spite of the general use of exhaust fans throughout the civilised world, the House of Commons has only just made up its mind to abolish the exhaust furnaces which have been employed in succession ever since the time of Dr. Desaguliers—some 180 years ago. This example shows the strides that are being made in the acquisition of scientific knowledge in the present day. The proposal to employ improved intake fans and modern water screens is also a hopeful sign, and the suggestion that the cleansing arrangements should be placed under one authority indicates an appreciation of those principles which are to be found in every well-conducted establishment. Divided responsibility may sometimes be convenient for political reasons, but it never answers in administrative departments.

Up to this point there is little fault to be found with the belated recommendations of the Report; but in proposing the experimental introduction of air beneath the seats of the House, and the conduct of further inquiry into problems of ventilation, the Committee shows clearly that no real progress has been made with the inquiry undertaken. The Report states the obvious truism that no system of ventilation can give satisfactory results unless accompanied and supported by a thorough, systematic, and frequent cleaning of all parts of the chamber and its adjuncts. It then adds certain maxims that are thoroughly known and acted upon by every cleanly housewife, and thereafter it collapses. Pending the results of the inquiry recommended, the Committee is not prepared to make any recommendation with regard to the general scheme of ventilation, although the further introduction of fans is advised in committee rooms. Hence the general conclusion formed as the result of a fifteen months' deliberation is that an inquiry should be instituted.

If things go on in this way, the ventilation question will not be settled for a generation, or, perhaps, not before the completion of Vauxhall Bridge. Why so much trouble and mystery are made about the heating and ventilation of the Houses of Parliament we cannot imagine. Plenty of large buildings are successfully treated every year in this country and abroad, and we are confident that any experienced firm of heating engi-

neers would be able to find a satisfactory solution of the problem, and to have all the necessary apparatus at work within a few months if the authorities would follow the course adopted in general practice.

NOTES.

The Motor-Car Bill.

THE public are to be congratulated on the concessions that have been wrung from the Government in the Motor Traffic Bill. A test of efficiency has been conceded and the Government have also yielded on the vital question of speed limit. When people in the position of Mr. Wilson Noble write to the *Times* describing a driver "who has been crawling along at twenty miles an hour on the Hog's Back" being tempted to exceed this limit down hill into Guildford, it shows such an utter lack of appreciation of what is a reasonable speed for light locomotives on high roads that it would be hopeless to leave motorists any discretion in the matter, and it is a matter for general congratulation that the Government have decided to enforce consideration for the public safety, to say nothing of good manners, by law. The form of the suggested amendment in the Bill is, moreover, most reasonable, as an infringement of the speed limit when it is dissociated from actual danger to the public at the time and place, will be visited with a different penalty, and will not involve the imprisonment of the offender. It only remains to be seen what speed limit the Government will suggest, but there will be some difficulty in arriving at a satisfactory determination on this point, for since this provision is in no way to affect the prohibition against reckless driving, it is obvious it must not be placed too low, whereas if a high speed is allowed it will be considered by many drivers as an indication of the minimum reasonable speed.

Municipal Trading.

THE Liverpool City Council announces a rehousing scheme which is estimated to involve an expenditure of 1,000,000*l*. It will be interesting to see what effect the resolution of the large financiers not to underwrite any more corporation loans for the present will have on new issues. It appears likely to have more effect in checking municipal trading than the report of any Commission, and since corporation stocks are issued for speculative purposes, trustees will certainly avoid them. A difficulty in raising these loans will necessitate a higher rate of interest being offered, a strain which the corporation undertakings cannot afford to bear, and which will make their financial position less satisfactory than ever. It has now become apparent that the public really hold the key to the position, and can decide this question of municipal trading one way or the other by the control of the purse, in which, as ratepayers, they are directly interested.

The Perth Cricket Ground Disaster.

IT is to be hoped that the collapse, on Saturday last, of the Grand Stand at Perth, following as it does the more serious misadventure at Ibrox Park, will have some salutory effect upon the officials in whom is vested the duty of inspecting such structures in Scotland. In the present instance there was no loss of life, but about 100 out of some 600 occupants were injured—some of them severely. The stand is stated to have been about 100 ft. long by 20 ft. wide. It included a platform, 4 ft. wide by 2 ft. high, in front, and nine tiers of seats rising to a height which in one report is given as 14 ft. and in another as 30 ft. It appears that the structure consisted of timber trusses spaced at 6 ft. centre to centre, and held together by battens and boards, and also by the seats. No other lateral bracing was provided, hence, on the failure of some horizontal timbers during an exciting part of the game, the whole structure collapsed like a pack of cards. From a structural point of view, this mishap is much worse than that at Ibrox Park, where only a portion of the decking dropped out leaving the framework intact, whereas in the present instance the sudden snapping of a few planks allowed the whole stand to fall flat upon the ground. It is stated that the usual official inspection had been duly made, but events have proved that there could have been no really adequate examination. We do not, of course, profess to make any suggestion as to who may be responsible for the mishap. That is a matter which, it is to be hoped, will be settled after due inquiry. Two points are clear, however —(1) That the horizontal timbers were inadequate to carry the weight of the spectators, and (2) that adequate lateral bracing was conspicuously absent.

Lands Compulsorily Acquired.

THE principle adopted by the arbitrator and affirmed by the Court in the case of the Mayor of Plymouth and the Duke of Northumberland is one of importance to those whose lands are acquired compulsorily. The Corporation was acquiring land compulsorily for the site of a reservoir, and the land required belonged to three separate owners. The Corporation contended that each plot ought to be valued as a separate and independent property, no regard being had to the fact that when acquired with the adjoining lots it afforded conditions peculiarly adapted to the site of a reservoir. The claimant, on the other hand, contended that all the plots should be valued as though they were all one in the same ownership. The arbitrator steered a middle course by regarding the lots as separate entities, but giving consideration to the advantages and disadvantages each was subjected to by the acquisition of its neighbours, and the Court has affirmed this decision. It is clear that either of the parties' contentions would have worked an injustice.

Wind Pressure and Moving Machinery.

WHILE the effect of wind pressure on buildings, bridges, and kindred structures is carefully considered, and the effort is always made to ensure stability, practically no care appears to be taken to guard against the overturning of railway trains, travelling cranes, and other machinery by the force of wind. Only a short time ago we had an example of a train being blown over on the Leven Viaduct, while the viaduct itself was able to withstand a wind pressure calculated at 94 lbs. per square inch, and on Friday last week a large steam crane was blown into the Mersey at the extension works of the Brunswick Dock, Liverpool. This crane, weighing about 20 tons, was situated upon an elevated travelling platform, and it was seen to fall over into the river when struck by a sudden gust of wind, carrying with it five men who were at work inside the house, and unfortunately, four of these men were drowned. It would be difficult to suggest any satisfactory means—except that of reducing the proportion of surface to weight—for preventing railway trains from being overturned, but the fact remains that at present passengers are exposed to risk in stormy times, and the problem is one deserving of attention from railway engineers. In the case of cranes in exposed positions there is not so much difficulty, and some mechanical device ought in future to be employed to guard against mishaps.

Repairs to Private Roads.

A CURIOUS point arose in the case of Moore *v.* Todd upon which the Court of Appeal have taken a view different from that of Mr. Justice Bigham. In the year 1888 a landowner, with a view to developing his property, widened a road in front of it, and, as this widening conferred some benefit on the land in other hands on the opposite side of the road, the owner of the latter agreed to contribute a lump sum on condition "that he should not be liable to contribute to the maintenance or repair of the said roadway, sewer, and main drain" until the same should be "taken to by the parish or some other local or public authority," and until that event happened the road was to be solely maintained by the other party, the defendant to this action. In 1901 the Local Authority, acting under Section 150 of the Public Health Act, 1875, made up the road and levied contributions on the owners of the land, and the plaintiff, by virtue of the above agreement, claimed to be repaid the amount so levied from the defendant. The Court of Appeal have now held that this agreement only applied to the roadway as originally constructed by the defendant, and that it did not embrace the expenses demanded by the Local Authority under the section. The Court said the question was one of some difficulty, and it affords another example of the care that should be applied in drawing agreements in relation to landed and town property. The parties too often regard only their own intentions, and forget the liabilities imposed on their property by the tangled mass of legislation dealing with the powers of Local Authorities. In the present case it seems fairly clear that the intention of the parties was that the lump sum payment was to cover all the liabilities of the plaintiff in respect of the road until the inhabitants at large should become responsible for it; yet a study of the statute would have revealed the fact that the Local Authority under Section 150 had power to call for considerable expenditure quite outside its "maintenance and repair," such, for instance, as for paving, lighting, &c., and that such expenditure must be a condition precedent to the adoption of the road by the Local Authority under Section 152.

The Proposed Yenikalé Bridge.

ONE of the most important bridge projects on foot at the present time provides for the construction of a railway bridge between the Crimea and Northern Caucasia. At the point selected by the consulting engineer

the distance across the Straits of Yenikalé, or the Strait of Kertch, as the passage is alternatively called, is about 1½ miles, and the bridge would facilitate the establishment of direct railway communication between Russia and Central Asia. No details are available at the moment as to the type of construction to be adopted in this extensive scheme, but as the Straits of Yenikalé afford the only entrance from the Black Sea to the Sea of Azof it will clearly be necessary to erect a bridge of sufficient elevation to permit the passage of steamships and other vessels plying between the two inland seas. The proposed work will be fully 50 per cent. longer than the Forth Bridge, and bearing in mind the necessity for avoiding interference with navigation, it will probably be one of the most remarkable structures hitherto contemplated. According to the engineer's estimate the cost will be about 850,000*l.*, and it is announced that the project has been approved in principle by the Russian Government.

Vulcanised Timber.

We have received some samples of Powell's patent vulcanised wood, and are asked to express our opinion of them. By the process the timber is first saturated at boiling point with a thin solution of common refined sugar, and afterwards the water is evaporated at a high temperature, leaving the interstices in the wood filled in with solid matter, and the timber is said to be then vulcanised, preserved, and seasoned. Tests in regard to absorption, compression, and bending have been carried out with ordinary wood and wood treated by this process, and they have shown that the "processed" wood was superior in every respect, so far as these particular tests are concerned. Beech showed the most remarkable alteration after its conversion, for its specific gravity was increased by no less than 50 per cent. Whilst during immersion for fourteen days the normal beech absorbed one pint of water, the vulcanised blocks absorbed less than one-fifth of that quantity. We have made some independent experiments with the samples sent to us. Not having had corresponding pieces of the planks from which the treated samples were cut we cannot, of course, give any relative values in regard to absorption. But the sample of maple sent is remarkably non-absorbtive. The elm and oak also showed very little tendency to imbibe much, and the beech came fourth. For the rest, poplar, ash, Canary white wood, and three varieties of pine we have no elements for comparison, but none of them absorbed much water during a fortnight's immersion. Micro-sections of the different woods throw but little light on the nature of the alteration effected in them by this preserving process, but the majority of the cells are filled with some dark substance, and are not in their natural state. We are informed that the specimens we have examined have all been subjected to a fairly high temperature—over 140 deg. Fahr., and some over 200 deg. Fahr. They show no signs of splitting. We have come to the conclusion, after our experiments, that the process must increase the durability of the woods; and the only adverse criticism we have to make is that the woods are all to some extent discoloured. The process seems to make the grain of the wood more visible, however, and that is often an advantage where the wood is to be polished and not painted.

A Relic of Old St. Giles-in-the-Fields.

An interesting building, latterly used as printers' offices and as a workshop by the contractors for the Central London Railway, is being demolished for a theatrical-scenery factory to be erected by Mr. J. Carmichael, contractor. The old building stands in Little Denmark-street, at the north-eastern end of Lloyd's-court, near the churchyard gate, and was built in 1816 as a schoolhouse for the charity founded under William Shelton's will of August 5, 1672, in favour of the parishes of St. Giles-in-the-Fields, St. Martin-in-the-Fields, and St. Paul, Covent Garden. The land, of which the trustees of Carter's Foundation, at Wilford, near Nottingham, are the freeholders, had belonged to Mrs. Elizabeth Sewell, *née* Lloyd, whose will mentions that her house (pulled down in 1727) formerly stood on the site. The school-house had served of late years as a residence of the master of the adjoining National Schools; the tenancy by the Shelton Charity expired in 1877. It is, or rather was, octagonal on plan, with a central column or pillar that had been utilised for the flues of the fireplaces on the two floors. In our issue of June 13, 1891, we reproduced a bird's-eye view, of about 1560, showing the buildings on this spot and the precincts of Queen Mathilda's lazar hospital, having a high wall along each of the three sides; the triangular space being bounded by Elde-strate (since Hog-lane, or Crown-street, and now Charing Cross-road), Le-lane (since Monmouth, then Dudley-street, and now Shaftesbury-avenue), and a wide thoroughfare—the present High-street—that separated the precincts from the Pitaunce Croft or Sixteen-acre Close of Blemundesburye Manor. At the Reformation the property was granted to John Dudley, Viscount L'Isle and Duke of Northumberland, who built on the site of the hospitium a house, which subsequently belonged to the Dudleys, Earls of Leicester, and Alicia, Duchess Dudley, whose cenotaph (1669) is preserved in the parish church; that house stood between the later Lloyd's-court and Denmark-street. Just north of the old school-house is the "Judgment" or "Resurrection" gate of the parish churchyard. The stone gate, having the curious oaken carving in the tympanum of the arch, was removed thither in 1865 from the north side in High-street, where it had replaced the gate built in 1687 of red and yellow brick by Love, the carver, who was paid 20*l.*, after a design by W. Leverton; confer Hatton's "New View," 1708. The new National Schools at the corner of Endell-street—the way to the Elms of the bird's-eye view—were built after E. M. Barry's designs, and are illustrated, with two plans, in the *Builder* of December 22, 1860.

MAGAZINES AND REVIEWS.

The *Quarterly Review* includes, among the articles in a very good number, one on "The Royal Academy and Reform," which is full of truth and good sense, and will not be without its effect on public opinion; that it will have any effect on the Academy we doubt, for though there are individual academicians who are far-seeing men of wide artistic sympathies, they seem to have little weight in the body to which they belong, which in its official and corporate character and procedure is one of the most narrow-minded, prejudiced, and selfish of public bodies. Is it, indeed properly a "public body" at all? Is it not rather, as the writer of the article suggests, "a private art-club," chiefly concerned with the interests of its own members? The action of the Academy in using the Chantrey bequest to buy in the works of its own members is not alluded to in the article, though it might well have been. The two chief charges made by the *Quarterly* critic are that the Academy is far too limited in its numbers, and is jealously kept so; and that (as we have over and over again said) it is not really an Academy of Arts at all, but an Academy of Painting, with sculpture and architecture allowed a small show in a very unsatisfactory manner, and other forms of art ignored. The remedy suggested for the first evil—that the Academy should be open to all artists of repute without limitation as to numbers, we cannot concur in; it would be unworkable; but the number of Associates should be increased and they should have more voice in the proceedings than they have at present. In regard to the second point, a very good suggestion is made—that the Academy should hold two annual exhibitions of modern work instead of one; the first to be devoted to pictures and to such forms of sculpture as are meant to stand by themselves; the second to architecture, to sculpture and carving in connexion with architecture, and to such minor arts as jewellery, furniture, metal-work, &c. The writer seems to have forgotten stained glass, a very important art, perhaps hardly to be called a minor one; we have long urged that the Academy ought to make arrangements to exhibit actual glass, and not the wretched expedient of small coloured drawings; and with the double exhibition it would be possible to do this. We must, of course, recognise the fact (touched on by the writer) that painting is the most popular of the arts; though the question may be asked whether it is the business of the Academy to bend art to popular standards. Why the *Quarterly* critic proposes that the Academy should give up its schools we do not understand, nor do we see any reason for such a course. On the contrary, it appears to us that the instruction it provides free of cost, for those who have shown that they are worth it, is the best thing the Academy does. Nor do we see at present any signs of the success of the large number of younger artists who we are told intend "to do without the Academy." After all is said, the Academy is still by far the best exhibition of modern painting and sculpture that we have in London; only it might be so much better.

Among other articles in the same issue of the *Quarterly* are a very useful one on Submarine vessels (with diagrams), and one by Sir Oliver Lodge on "The Survival of Personality," being a review of the late Frederic Myers's book; a subject which, as far as it can be grasped, interests us all, irrespective of profession or art.

To the *Art Journal* Mr. Howard Ince contributes an article which he entitles "A Reference to Tangier," accompanied by a number of excellent and characteristic sketches of his own, of bits of the oriental architecture of Tangier, almost untouched by European influence. Though the article is mainly written to describe the sketches and the architecture, there is a short but interesting summary of the history of Tangier in relation to England—a curious one, and not very creditable to English policy of a century ago. Mr. Arthur Tomson contributes an article with his own illustrations, on "Studland," the quiet and picturesque village near Swanage, with a Norman church. Under the title "A Decorative Achievement in Glasgow," Mr. Percy Bate gives a description, with illustrations from photographs, of what appears to be a really artistic set of business offices in Glasgow, in which a Glasgow sculptor has worked with a Glasgow architect, and the Scottish Guild of Handicraft has produced metal-work of original design. Of the two sets of finger-plates given, however, we object to those on page 251, as perspective interiors with figures are quite unsuitable either for repoussé work in general or for finger-plates in particular. Those on the preceding page are far better; the designs consisting of decoratively-treated figures with no attempt at realistic effect, and the lines of which harmonise with the general line of the plates.

The most interesting thing in the *Magazine of Art* is the rather sad but charmingly simple and sincere narrative of a Japanese artist, Mr.

Yoshio Markino, who has been endeavouring with some difficulty to get his living in London by sketches and studies of London figures and scenes. Illustrations of three of his drawings are given, one in colour, and it is interesting to see the result of the Japanese habit and style in drawing, appearing through the portrayal of figures of London life. But every one who reads the narrative will feel drawn towards the writer of it, to whom we wish more success, as the world counts success. The best kind of success, the thorough enjoyment of his art, he evidently has already. Mr. Raffles Davison continues his essay on "The Recent Advance in Architecture" as illustrated in country houses. He quotes a characteristic remark from a client—"I am quite sure that in country houses it is pleasantest and best to build with simplicity, but I am equally sure that simplicity is very expensive." We believe it is usually found to be so, but the explanation of the enigma is that the only architects who will design with simplicity, at present, are those who demand, and specify for, good work and good materials. Many much more showy houses are built with inferior work and materials, and hence are cheaper though at first glance they may look more expensive. A jerry-builder's "simplicity" will be cheap—as long as it lasts. Mr. Davison's notion of the advance in architecture lies rather too much in the direction of eccentricity and of what we may call the self-conscious picturesque; that is to say, the illustrations selected tend in that direction. "The decorative figure-work of Mr. Frank Brangwyn" is the subject of another illustrated article. We deny that the "Panel for L'Art Nouveau" and the "Panel for a Bedroom" are "decorative," except in principle, for decorative work should surely be beautiful, and these are not. Now "The Flute Players," a design for stained glass, really is decorative, that is to say, its lines are beautiful and not merely its æsthetic treatment; correct æsthetic (as to flatness, proper treatment of material, &c.) is not enough in itself to save the soul of a decorative artist or of his spectators. The design for tapestry "Le Roi au Chantier," is also truly decorative, and so also is the elevation called "Design for an Interior." The article on "the Paris Salons" by Prince Karageorgevitch appears to us singularly wrong-headed in its preferences; or perhaps one should not say "singularly," since nearly all writers seem to have got something wrong in their heads about French art, and praise all its eccentricities as if they were virtues. We find the old cant, which we are tired of hearing, that the New Salon is full of the work of artists and the Old Salon of that of people who paint pictures to sell; a remark which it is almost supposed now to be the correct thing to make; whereas any one without a bias in his judgment can see well enough that the New Salon is getting steadily worse; that to fill its walls it admits things which the Old Salon jury would dismiss as utterly below the mark for exhibition; and that, in spite of all the "pot-boiling" which undoubtedly finds place in the Old Salon, it contains a considerable number of pictures far superior to anything to be found in the New Salon, while in respect of sculpture there is absolutely no comparison possible. Mr. Spielmann is continuing his valuable series of articles on "Art Forgeries and Counterfeits," the present number dealing with forgeries in leather-work, silver plate, gold jewellery, precious stones, cameos, and furniture and wood-carving. Some of the revelations in these articles are extraordinary; they should be read by all who are possessed with the desire to become collectors. The writer quotes Mr. King's Handbook on "Engraved Gems" to the effect that "for every antique gem of note fully a dozen of its counterfeits are now in circulation, and often so close is the imitation as to throw doubt on the authenticity of the original itself." In the 1900 Paris Exhibition a jeweller exhibited four strings of pearls, honestly stating that one of them was false, and defying any expert to say which of them it was, by any test short of crushing. The result, it is stated, "was entirely satisfactory to the manufacturer." In fact, Mr. Spielmann's evidence leads to the conclusion that in purchasing at the present time any kind of antique, you are on the whole more likely to be purchasing an imitation than an original, unless the objects are from a known collection formed and kept untouched before the present genius for imitation was developed.

The *Burlington Magazine*, the current issue of which is always published too late in the month to come into our review, contains in its July number a series of articles on artistic subjects, ancient and modern, which are all of interest, and some of which illustrate novel and rather out-of-the-way subjects. Such is M. Blochet's article on "Mussulman Manuscripts and Miniatures" as illustrated in the recent exhibition at Paris. The prohibition to paint figures, embodied in the Mahommedan religious code, of course weighs heavily on Mussulman art, though it appears to have been evaded or disobeyed at times, as some of the illustrations to this article show, among others the exceedingly curious drawing of a fat man struggling with or holding a serpent, from the astronomical treatise of Abd-er-rahman-el-Sufi; apparently a symbol of the constellation Draco. There is a good review of the Dutch exhibition at the Guildhall (not signed); the writer truly remarks that the modern collection was far more representative than the ancient one, and, as he says, must have been a revelation to many. He does full justice to Jacob Maris, without overlooking the two others of the name. That Israels is a very unequal painter we agree, but we should hardly say that Mauve was; certainly not as illustrated in this exhibition, except for one or two small and slight things which can only be regarded as sketches; and in the mention of his best works there we are surprised to find no reference to that perfect picture of the sheep under the trees, which hung close to the door (we forget its title), and which was certainly one of the finest things in the whole collection. "The Plate of Winchester College," an article by Mr. Percy Macquoid, is accompanied by some very fine illustrations; in fact, the illustrative department of the magazine is altogether of the highest order, as well as the printing and make-up. It includes examples of French furniture of the seventeenth and eighteenth centuries, and a number of illustrations from Sir Joshua Reynolds, including his fine series of figures for New College window—"Temperance," "Prudence," "Fortitude," and "Justice." It seems to be intended that the writing should be done by contributors with special knowledge of their subjects, and of course the magazine is not one for popular interest: it is issued for the esoteric circle of art-lovers and art-students. It is to be hoped there is a numerous enough public among these to keep such a periodical going.

The *Cornhill Magazine*, which has been giving a series of articles on "Prospects in the Professions," taking one profession after another, takes in this month that of "The Artist"; to which we may object in the first instance that art is not a "profession." As it is so ranked here, however, one is not surprised to find that the subject is treated from an exclusively money-making point of view. It is advisable to paint "small pictures," they sell better; a certain dealer attributed his success to "never buying a picture that could not be carried under the arm"; though unfortunately "the Academy and other exhibitions compel pictures to be of an absurdly large scale"; which at all events is something new. Artists neglect their opportunities, we are told, through want of worldly wisdom. The writer of the article was recently on a well-known salmon river in Scotland; "at every turn was a picture, and every pool was the haunt of a fisherman." The richest men in England and America come to fish in this stream; if an artist would only paint "portraits" of all the scenes on the forty miles of stream, the rich fishing men would buy them wholesale as reminiscences of their sport. That, apparently, is the writer's notion of the objects of landscape-painting—to make "portraits" of places that people are interested in. It is a truly British idea! There are some true remarks in the article, especially as to the want of encouragement to artists from the State or from Royalty in this country; but the article can hardly, we should think, have been written by an artist. If the writer is one, we can only say that he has a very poor and debased conception of his calling.

Knowledge contains an article by Mr. Arthur H. Bell, on the important subject of the possible future use of wireless telegraphy in assisting the preparation of weather forecasts. One of the principal difficulties in weather forecasting for this country is that the whole space of the Atlantic is out of the region of telegraphic communication in regard to the movements of storms; we can get the latest information from the eastern shores of America, but after that we have no information as to the path of storm centres till they reach our own shores. Mr. Bell's idea is that by the aid of wireless telegraphy, when further developed, information as to weather in any part of the Atlantic could be communicated from ships actually at sea. In the same number is what we suppose is the close of the discussion between Mr. Burkitt and M. Antoniadi as to the exterior cross on the dome of St. Sophia, supposed by Mr. Antoniadi to have been described by the Silentiary. M. Antoniadi adopts a very positive attitude, but we do not think he has made out his case. We, at all events, cannot be persuaded that the word ἔγραψε could refer to modelling a cross in the round. The word means indifferently "writing" or "drawing;" it may be applied to any form of design on a flat surface, such as mosaic or *sgraffito* (which is in fact the Italian form of the same word), but we never heard of it being used to signify modelling in the round.

References to some other periodicals of the month we must defer to our next issue.

ARCHITECTURAL SOCIETIES.

MANCHESTER SOCIETY OF ARCHITECTS.—On the 25th ult. the members of this Society visited Bournville, near Birmingham, Messrs. Cadbury's model village. Mr. W. A. Harvey, the architect, met the party and showed them over a considerable part of the estate. Several houses were examined, and the nearly completed Ruskin Hall was much admired. It was thought that the great success, both social and architectural, of this experiment should do much to encourage similar schemes elsewhere. The Church of St. Agatha, Birmingham, was then visited, under the guidance of Mr. Bidlake, the architect, and also Messrs. Keep's warehouse, a refined piece of work by the same architect. The day was concluded by a visit to the Eagle Insurance Company's Offices, Messrs. Lethaby & Ball, architects, where the interior, with its beautiful marble and plaster work, was especially admired. Some of Mr. Edgar Wood's work at Middleton was visited on Tuesday evening, July 28, by twenty members. The Old-road Chapel has been lately decorated by the architect and Mr. Jackson, the painter, and has a charming internal effect of rich colouring. The new Wesleyan Chapel is an excellent piece of grouping, arranged picturesquely round a cloister or courtyard. Mr. Wood's own house is full of interest, and the formal garden he is developing shows what good results can be got on a very small scale.

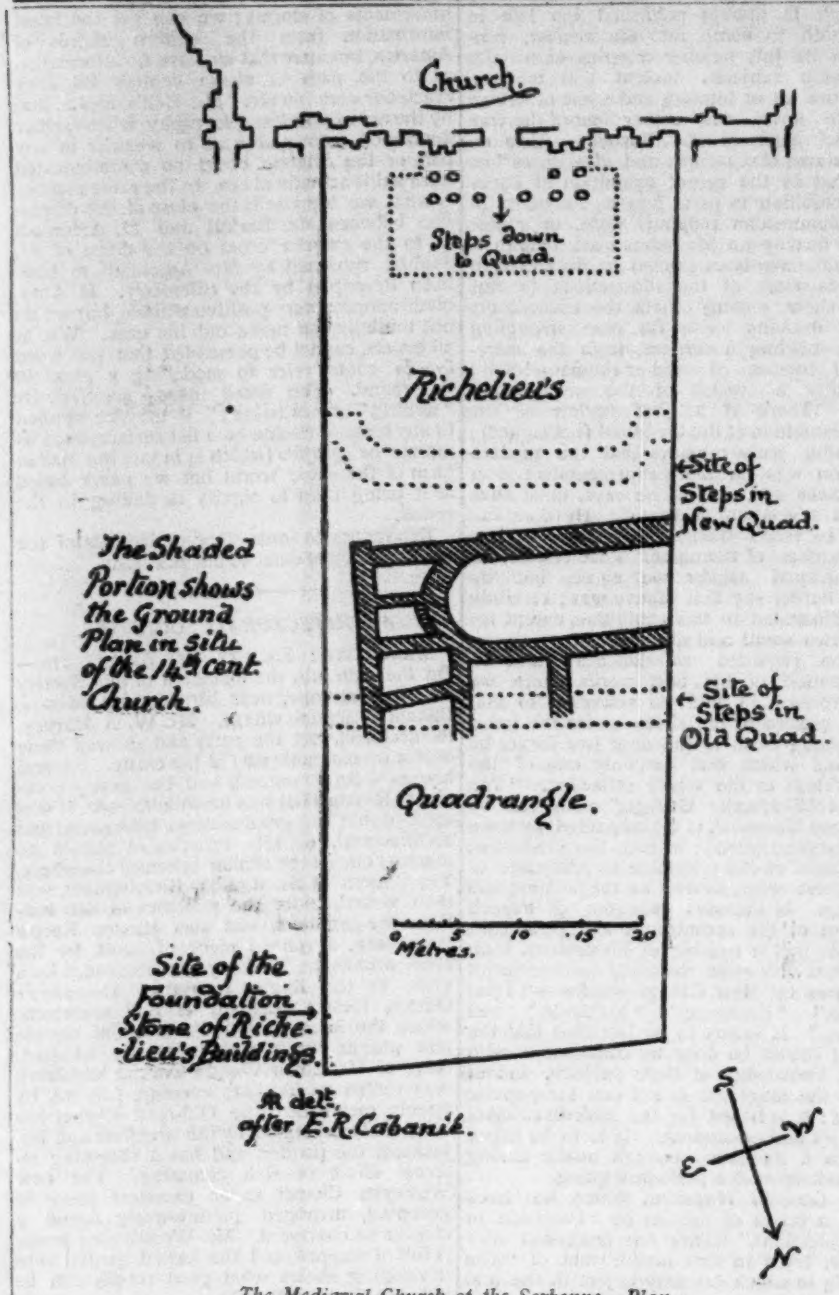
COMPETITIONS.

WATER SUPPLY, FLAMBOROUGH.—The competition for the best scheme for the water supply of Flamborough has resulted in the plans of Messrs. Elliott & Brown, of Nottingham, being adopted. Fourteen schemes were submitted.

MAIDENHEAD FREE LIBRARY COMPETITION.—The following is the result of this competition:—1st. Messrs. Blangy & Van Baars, 19, Old-square, Lincoln's Inn; 2nd. Messrs. McEwen & Kale, 3, Newham-street, Birmingham; 3rd, Messrs. North & Robin, 203, Strand, W.C. Mr. Edward Mountford was the assessor, and there were eighty-six designs submitted.

MANCHESTER ROYAL INFIRMARY.—The following architects have been selected to send in plans in competition for the building of the new Manchester Royal Infirmary, viz.:—Mr. H. Percy Adams, London; Messrs. Campbell Douglas & Paterson, Glasgow; Messrs. Edwin T. Hall & John Brooke, London; Mr. W. Cecil Hardisty, Manchester; Messrs. Heathcote & Sons, Manchester; Messrs. Henman & Cooper, Birmingham; Mr. John W. Simpson, London; Messrs. Thomson & Sandilands, Glasgow; Mr. A. Hessell Tiltman, London; Messrs. Waddington, Son, & Dunkerley, Manchester; Messrs. Thos. Worthington & Son, Manchester; and Messrs. Young & Hall, London.

COUNTY SCHOOL, ACTON.—The architects chosen to compete for the Acton County School competition are Messrs. Pratt, Adams, Pywell, Clay, Tiltman, Osborne Smith, and Giles, Gough, & Trollope. The drawings are to be sent in by October 31.



The Mediæval Church of the Sorbonne. Plan.

THE OLD SORBONNE CHAPEL, PARIS.

A LITTLE while ago it was announced that the foundations of the fourteenth century chapel of the Sorbonne had been discovered, and were going to be perpetuated by coloured slabs laid *in situ*, in the great courtyard north of the church. The plan is, however, being outlined in cement, and shows a semi-circular apse with a wall slightly thinner than the north and south walls of the chapel. There are rooms, or spaces (one of which has a staircase marked), at the east end; and a larger apartment, probably the sacristy, abuts on the north side of the chancel. There are no aisles and no transepts, but owing to the Rue de la Sorbonne "New Buildings" cutting across the western extremity of the nave, it is impossible to state for certain the length of the chapel, and whether it had any towers at the west end, as shown in the "Tapestry Map" of Paris.

The position of the chapel is at about 15 ft. below the steps across the great quadrangle, and, with the apartments at the east end, extends to within 10 ft. of the east wing of Richelieu's Quadrangle. The chapel was about 25 ft. wide inside, and from the interior extremity of the apse to the Rue de la Sorbonne buildings, measured about 75 ft. long. The south wall of the nave was about 8 ft. thick, the north one about 6 ft. thick, and the apse wall about 5 ft. thick.

The plan differs entirely from the one given on page 85 of Mr. Gréard's "Nos Adieux à la Vieille Sorbonne."

BOOKS RECEIVED.

THE MODERN CARPENTER, JOINER, AND CABINET-MAKER. Edited by G. L. Sutcliffe. Divisional-Volume V. (The Gresham Publishing Co.)

THE ROYAL ARCHÆOLOGICAL INSTITUTE AT YORK.*

THURSDAY, July 23, was devoted to a visit to the castles of Bolton and Middleham. The party, which numbered about a hundred, first went by train to Redmire, and then in carriages by a short but hilly journey to Bolton. Here the castle was described by Mr. W. H. St. John Hope, who pointed out that the building had been erected by Sir Richard le Scrop, probably in rivalry of the new works with which Ralph Nevill, the Lord of Middleham, had lately surrounded his Norman keep. Bolton had, however, been built upon a new site, and in the newest fashion, in the form of four ranges of chambers disposed round an open court with towers at the angles. Sir Richard le Scrop obtained licence to crenellate his house at Bolton in 1379, but Mr. Hope showed that he had already in the previous year entered into a contract with John Lewyn, mason, for the erection of certain works at Bolton, which, however, only appeared to extend to two sides of the existing building. The original contract is now in the possession of Lord Bolton, the owner of the castle, and is in French, but Mr. Hope submitted the following translation of the operative part of it:—

"In the first place a tower for a kitchen, which shall be vaulted and embattled, and shall be of a height of 50 ft. below the battlement, and shall be in length of 10 ells and in breadth 8 ells, and the outside walls of the said tower shall be of a thickness of 2 ells. Also there shall be made between the said tower for the kitchen and the gate a house vaulted and embattled, and above the vault shall be three chambers one above the other, and each chamber shall be of the length of 12 ells and in breadth 5½ ells, and the said house shall be of a height of 40 ft. below the battlement, and the thickness of the walls outside 2 ells and within 4 ft. Also there shall be an embattled tower which shall be of a height of 50 ft. under the battlements, in which tower there shall be a gate vaulted, and above the gate shall be three chambers, one above the other, and they shall be in length 10½ ells and in width 5½ ells. And in the same tower on the side of the gate towards the south shall be a vaulted chamber, and over that chamber shall be three chambers, one above the other, which shall be in length 13 ells, and in breadth 7 ells, and the walls outside of the said chambers shall be of a thickness of 6 ft., and within of 4 ft. Also there shall be a chamber adjoining the said tower on the side towards the west, which shall be vaulted and embattled, and of a height of 40 ft. under the battlement, and over the said vaulted chamber another house, vaulted, and above that a chamber which shall be in length 10 ells with the entry, and 5½ ells in width, and the walls without the said chambers shall be of the thickness of 2 ells, and the walls within of 4 ft. Also all the houses and chambers aforesaid shall have entries, chimnies, doors, windows, and privies, and all necessaries which are required for the said work. Also there shall be three staircases, one within the kitchen and two for the tower of the gate. Also all the walls within the aforesaid chambers which shall be parclose shall be of a thickness of 3 ft. or 4 ft., according as they require."

For the aforesaid works John Lewyn was to win his own stone, and to be paid 100s. for each perch, "measured by 20 ft. by the ell, as well for vaults as for walls" and to receive besides fifty marks. Sir Richard undertook to find wood for the lime-kilns, the carriage of all stones, sand, and lime, and the timber for the centres and scaffolds. According to Leland, the castle was eighteen years in building, and cost every year 1,000 marks. Mr. Hope also pointed out the arrangement of the buildings, and drew special attention to the singular way in which the portcullises that defended each doorway were merely drawn up above them, and not into a groove out of sight. He also indicated in the hall the singular contrivance noticed by Leland, whereby the smoke from the central fire escaped through holes in the heads of the windows instead of through the more usual louvre surmounting the roof. The castle, though for the most part in ruins, is well cared for, and from the top of one wing, which retains its floors and roof, the visitors were gratified by a magnificent view of Wensleydale.

From the castle a drive through Lord Bolton's park brought the party to Leyburn, whence, after luncheon, the journey was resumed to Middleham. Here Mr. Hope again acted as guide, and explained how the first Norman castle was now a small derelict moated mount on the rising ground to the north. The present castle consists of a quadrangle of ranges of chambers, with corner towers, erected by Ralph Lord Nevill of Raby, about the middle of the fourteenth century, enclosing a great rectangular keep or tower of two stories, the work probably of Robert Fitz-Ranulf, towards the close of the twelfth century. Were the tower absent, Mr. Hope pointed out, the plan would resemble that of the castles of Wressle and Bolton. Between the keep and the line of the eastern curtain, are the ruins of the chapel, which, though of the fourteenth century, is a curious example of imitation of the same style of architecture as the keep. The ranges of buildings forming the enceinte appear to have been erected within the lines of the surrounding ditch. From a survey of the castle made for King Henry VIII. in 1538, Mr. Hope was able to point out the uses of the various buildings. In comparison with Bolton, the present condition of Middleham Castle is most unsatisfactory, the mischievous ivy being allowed to grow unchecked, and only last February a large mass of masonry fell from one of the outer towers. An earnest hope was expressed that the owner, Lord Masham, would do something to prevent further loss, and take some effectual steps to support the overhanging turrets of the great Norman keep.

At the evening meeting a paper was read by Professor E. C. Clark, of Cambridge, on "College Caps and Doctors' Hats."

* Continued from last week, p. 133.

Friday, the 24th, was devoted to a day in York with the members of the Yorkshire Archæological Society. The morning was spent in visiting in succession the churches of All Saints' North-street, St. John Ousegate, St. Michael Spurriergate, St. Denis Walmgate, Holy Trinity Goodramgate, and St. Martin, Coney-street, with the object of examining the notable remains of old painted glass still existing in them. Mr. N. H. J. Westlake acted as guide, and pointed out the chief characteristics of the glass, especially as regards the examples of the Jesse Tree, which he believed to have been first invented by the famous Abbot Suger, of St. Denys, in France.

After luncheon the party reassembled at Clifford's Tower, where Mr. Hope, on being called upon, briefly referred to its history, and pointed out the reasons for believing that the mount on which it stood formed part of the castle erected by William the Conqueror in 1068 to overawe and dominate the city. The Bayle Hill, on the opposite side of the river, was, he believed, the second castle thrown up by William later in the same year, when the citizens again revolted, to keep in order those on the south bank of the Ouse, and with the other castle to control the passage of the river. According to Orderic this Bayle Hill was thrown up in eight days. Mr. Hope also referred to a project for effectually defacing the grand earthworks that encircle the city by laying them out with walks, garden seats, and planting them with shrubs and flowers. Such defacement he considered would be nothing less than a crime. Mr. J. T. Micklethwaite next described the extensive salvage works that have lately been carried out to arrest the fall of the tower. He attributed the existing walls to the time of Henry II., and said that originally there were no doubt buildings inside, chiefly of timber. The rest of the castle had been converted into a prison. The prison part had at different times been rebuilt, but the tower itself had always been preserved as a relic. Seventy or eighty years ago some ingenious people cut away part of the mount to make a road, and, as a result, the weight of the building was too much for the earth, and it bade fair to go down into the yard below. He was asked to come down and consult with Colonel Beamish, official surveyor of such buildings, and there was no shadow of doubt that the mischief was not in the walls but in the earth below. They agreed to report that it was a matter to be dealt with by an engineer who was accustomed to deal with earth pressure, and in the end an arrangement was made to carry out certain repairs. The whole of the moving part had been buttressed up, and he believed that part of the wall was now safe from further movement. He would not say that the whole castle was, because the cutting away of the toe of the mount extended to the other end. There had up to now been no sign of movement, and they hoped this state of things would continue. In the course of the work some curious things were found, including the stones on which he was standing, most of them thirteenth-century work. At present, except that some few seemed to belong to the chapel, they could not say really what they were. Below the ground on which they were standing were a series of piles and rails joining them, and this was believed to be the palisade of William's castle, which Mr. Hope had told them about, and he believed it was all there below their feet. When these stone walls were built the mound was apparently heightened, and the piling was no doubt left to stiffen the new earthwork. He thought a little investigation to help them to plan it out would be well worth doing. As the Yorkshire Archæological Society had from time to time undertaken to investigate such work, they might put their hands in their pockets and spend a little on this. It would be most interesting to find the actual wooden fortification of the eleventh century.

Mr. Munby, the official custodian of the property for the Yorkshire County Council, in whom it is now vested, also added some remarks on the works lately completed.

A move was next made to the Merchants' Hall, in Forsgate, which was inpected under the guidance of Mr. H. Platnauer.

The day's proceedings ended with a visit, by invitation, to the pleasant grounds of the Yorkshire Philosophical Society, containing the remains of St. Mary's Abbey and of St. Leonard's Hospital, and the multangular tower and other portions of the Roman defences of York. For some time past an acrimonious local controversy has been carried on in the newspapers and elsewhere as to the treatment of certain recently-excavated portions of St. Mary's Abbey. Additional interest, therefore, attached to this visit, inasmuch as it had been decided to await the expert opinion of members of the Institute before coming to any conclusion in the matter.

The party having assembled at the scene of the excavations on the site of the destroyed choir, Mr. Hope briefly narrated the story of the foundation, and suggested that the recently-exposed apses were portions of the church begun by William Rufus in 1088. In plan they were at present quite unique in this country, and it behoved them to take every care of them. When they were first exposed he happened to come over and see them, and was asked what had better be done to preserve them. There were one or two courses open. The first was to bury them again, but the Society did not want to do that after spending money in uncovering them. Then there was a second course, which had been adopted, and for this reason. These gardens formed a playground for the children of the subscribers, and it was obvious that if such rough foundations, which were in a very tender condition, like all newly excavated work, were left unprotected the children would run over them and reduce them to a more or less shapeless mass. Obviously the first thing to do was to make secure in its place every one of the original stones, which he advised should be done with lias lime mortar, put in with a stick and not with a trowel. Cement, owing to its expansive property when used in small quantities, ought not to be employed. Seeing that the remains were standing up to various heights, he suggested that they should be brought to a common level with brickwork, the advantage of this being that there was no confounding it with eleventh-century rubble. Having done that, they had to guard against rain and frost, and the best way was to cover the top with Yorkshire flags. As a result, all this work had been anchored down for posterity. Mr. Hope went on to suggest that the areas which were originally within the church should not be turfed, but would have been better covered with gravel.

Mr. Micklethwaite, who followed, agreed with Mr. Hope as to the method of preservation adopted, and said incidentally that the fiend the archæologist had now to fight was the landscape gardener who worked for an ignorant public.

Mr. J. Bilson urged the carrying out of excavations on the opposite side, so as to clear up the history of the middle part of the building. There was no other building like this in the country, the analogies being in France. No architect could have put the points more clearly than Mr. Hope. By covering up the plan, they would be depriving their descendants of the opportunity of studying them. He himself had done precisely the same thing at Howden with regard to flag covers, and they could not see the top of the walls, and water could not get in, and no one objected. Last year he had the privilege of taking over the excavations at York M. le Comte de Lasteyrie, Professor of Archæology at l'Ecole des Chartes, Paris, and a member of the Commission des Monuments Historiques. There was not a man in France whose opinion would carry more weight, and he expressed cordial approval of what had been done, and expressed a wish that all the foundations might be treated in the same manner.

M. Camille-Enlart (formerly Librarian of l'Ecole des Beaux-Arts, now Director of the Museum of Comparative Sculpture at the Trocadero, Paris, and also a member of the Commission des Monuments Historiques), addressed the meeting in French, and likewise expressed his approval of what had been done.

The President, Sir Henry Howorth, accordingly proposed the following resolution:—"That the members of the Royal Archæological Institute, at this their meeting in York, desire to emphasise the importance of preserving the early remains of the Abbey Church of St. Mary, and are of opinion that the method which has been adopted for their preservation is the most satisfactory and excellent one available."

Mr. E. W. Brabrook (Vice-President) seconded the resolution, and, after some remarks by Mr. W. W. Hargrove on the part of the local objectors, it was put to the vote and carried unanimously.

The visitors were afterwards entertained at tea by the Philosophical Society.

In the evening the Lord Mayor and Lady Mayoress of York held a reception of the members of the Institute at the Mansion House, where the civic insignia and a number of interesting muniments and charters were displayed for their edification. At the request of the Lord Mayor Mr. Hope gave a description of the insignia and plate, which include a fine great mace and other pieces, the work of York, goldsmiths, and the sword of the Emperor Sigismund that was once hung over his stall as a Knight of the Garter in St. George's Chapel, Windsor. This was given to the city in 1439 by a Canon of Windsor who was a native of York.

On Saturday, the 25th, the members journeyed by rail to Doncaster, and thence by carriages to Conisburgh. Here the castle was described by Mr. Hope, who showed that historically it was no doubt the work of William de Warenne, and had at first consisted of a great moated mount, with a small outer bailey on the west, originally defended by palisades. On the substitution of masonry for the timber defences, probably early in the twelfth century, the outer court had been neglected, and the new defences confined to the margin of the mount. Subsequently, the splendid circular tower had been added towards one edge of the fortified area: perhaps from its likeness to the Orford keep, which was in building from 1170 to 1175 and onwards, about 1170, by Hammeline, Earl of Surrey, the husband of the heiress of the Warennes.

After a thorough examination of the keep by the party, the journey was resumed to Roche Abbey. Here, after luncheon, the remains of the Cistercian Abbey church and the foundations of the monastic buildings were explained by Mr. Harold Brakspear, who called attention to the extreme beauty and simplicity of the architecture, and pointed out the order in which the buildings had been erected.

M. Camille-Enlart spoke of the universa character of Cistercian abbeys wherever they were found, in Germany, Italy, France, or Grea Britain, and said he had been specially struck by the resemblance of the photographs of that abbey to certain Cistercian abbeys in the Alps. He referred to the mode of life and the habits of the Cistercians, who generally built in a valley near a stream, and engaged in agriculture and worked their mill by the stream. They provided an infirmary for old or sick monks, which was always an important part of a Cistercian abbey, but was always apart from it.

Tickhill Castle was the next place visited. It was, however, difficult to see anything of it except the gatehouse on account of the masses of ivy that hid the walls and the number of trees that concealed the mount. Mr. Hope, in describing the castle, pointed out that it consisted of one large court, roughly oval in form, with a lofty mount near one end. The remarkable early gatehouse was the work either of Roger de Buisli, the builder of the castle, before 1098, or of Robert of Bellesme before 1102. The curtain wall, which was certainly later, was mentioned in the Pipe Roll for 1130-1, and the ten-sided tower that crowned the mount was built in 1178-80. The chapel, hall, and other buildings have for the most part disappeared. The castle is encircled by a ditch, which is a rare example of a moat more or less filled with water.

A brief visit was also made to the fine parish church, which was described by Mr. John Bilson. The party subsequently returned to York.

Monday, the 27th, was devoted wholly to a visit to the little known but extensive remains of the Charterhouse of Mount Grace. The party first went by train to Northallerton, where carriages were in readiness for the rest of the journey. On arrival at Mount Grace the visitors were met by the owner, Sir Lowthian Bell, Bart., and as there was plenty of time the interval before luncheon was occupied in listening to an address from Mr. Micklethwaite on the characteristics of the Carthusian order, and the manner of the daily life passed by the monks, the peculiarity of it being that they lived most of it alone in their cells. After luncheon the remains of the buildings were inspected under the guidance of Mr. W. H. St. John Hope, who pointed out the division of the monastery into a large outer court containing the church, chapter house, hall, kitchen, guest houses, stables, &c., and an inner court, also of considerable area

forming the cloister, and having round it the cells and gardens of the monks. A further set of cells and gardens which had subsequently been added, had, from want of other room, been arranged round a smaller cloister about the church in the outer court. Mr. Hope also described the subdivision of the cells by partitions into an entrance lobby, a bedroom, a study, and a keeping-room, this last being furnished with a fireplace. A narrow stair at one end of the lobby led to an upper room where the inmate could employ his spare time at such indoor work as was lawful, such as writing books, bookbinding, weaving, &c. The gardens might be cultivated or not, as the monks preferred. Considerable remains exist of the cells and other buildings, and the church is, with the exception of the choir, still fairly complete, even to the little pinnacles of its central steeple. One of the cells on the north of the cloister is being carefully reconstructed by Sir Lowthian Bell on the original lines.

The journey back to Northallerton was the first during the meeting upon which rain fell, but it ceased before reaching the station.

In the evening the annual business meeting was held under the presidency of Sir Henry Howorth, when the Report of the Council was read and approved, and a satisfactory balance-sheet presented by the treasurer. The concluding meeting followed, when votes of thanks were passed to all those who had assisted in the carrying out of a most excellent meeting. Several places were suggested for next year's meeting, including Bath, Bristol, Worcester, and Normandy; the two first-named received most support, but the decision was, as usual, left to the Council. The President also referred to the presence during the meeting of M. Camille-Enlart and other French archæologists, and spoke of the satisfaction it had given the members that so much interest had been taken in their proceedings by their French brethren.

Tuesday, the 28th, was the concluding day of the meeting. A special train conveyed about seventy of the party to Gilling, where the church was first inspected under the guidance of Mr. John Bilson, who called attention to the Fairfax and other monuments. A move was next made to Gilling Castle, which Mr. Bilson explained was a rare example of a fourteenth-century rectangular keep, with later additions. The chief feature of interest is the Elizabethan great chamber, now used as a dining-room. It retains its beautiful inlaid oak panelling, surmounted by a painted frieze representing trees hung with shields of arms, as well as its original heraldic stained-glass windows and moulded plaster ceiling. The chimney-piece is also of the same time, and there is another of even finer design in an adjoining room. The rest of the house presents no features of interest.

A beautiful drive through the park brought the party to Coxwold. Here, after luncheon, the leading features of the church were pointed out by Mr. Micklethwaite, especially the singular octagonal tower, the monuments of the Bellasis and Fauconberg families, and the curious-planned eighteenth-century altar-rail. A visit was also paid to Byland Abbey, where the ruins of the great church and monastic buildings were inspected, under the guidance of Mr. Hope. This concluded the day's proceedings, and the journey back to York brought to an end a very satisfactory meeting.

ARCHITECTURE IN RELATION TO HYGIENE.

What is known as the "Congress Lecture" was delivered in connexion with the recent Sanitary Institute Congress at the Technical College, Bradford, on the 9th ult., by Mr. J. Slater, B.A., F.R.I.B.A.

Mr. Slater said that he would endeavour to bring before them some of the points of contact between hygiene and architecture, taking each of them in their broadest aspects. He remembered nearly four and twenty years ago, in a paper read before the Royal Institute of British Architects, mention was made of an architect of some eminence at that time who had built a house for a client, and some four months after its completion this architect was asked to come down and inspect the house, because some of the drain-pipes were stopped and there were difficulties with the plumbing arrangements. The architect was most indignant, and simply told the client to send for his plumber. He (the speaker) doubted if nowadays any architect, however much he might be imbued with an exalted idea of the high artistic nature of his profession, would take up such an attitude, as we had learnt to appreciate the fact that, however beautiful you may make a building, its main purpose is to be lived in or worked in, and that, unless it is constructed with due regard to health, it will be but a whited sepulchre. Hence the necessity for close supervision of all details of construction, however small or apparently unimportant. But there was a wider aspect of the question which had not often been dealt with—viz., How far the purely artistic side of architecture is concerned with hygiene?

"It is as well to clear the ground at the outset by accurately defining the issues of the subject. I am not going to discuss the vexed question of architecture being an art, a science, or a profession, and I shall simply take it—as it was once defined—as building at its best, and hygiene embraces all matters concerned with the health and well-being, physical and moral, of the individual and the community. So you see I do well to warn you that you may find me somewhat discursive. . . . People sometimes seem to forget how very modern sanitary science is, and how enormously difficult it is for any one—and I include members of my own profession here—to get out of the ruts in which they have been quietly jogging along year after year. . . .

It is more particularly with the smaller houses for the working and middle classes that these survivals are to be associated. In a nobleman's mansion, where there is a large staff of servants, cleanliness is generally attended to, though even here the servants' quarters often leave much to be desired; but in smaller houses the one aim should be to construct them in such a way as to leave to the inmates the very minimum of attention required to keep the places clean, because you may be sure, in many cases, that minimum will never be exceeded and often not reached. The amount of money that is expended in England, and in all the more civilised countries on the cure of disease, and on buildings devoted to that purpose, is simply enormous. The greatest care possible is taken to ensure cleanliness and to minimise opportunities for the propagation of microbes, and there can be no doubt that since the principles of sanitation have been known and carried out, the percentage of cures of all kinds of diseases has enormously increased. And yet, how much better is prevention than cure! Every year, in the outskirts of all our large towns, acres and acres of new sites are covered with houses for the lower classes, which, even when they are new, are scarcely sanitary, notwithstanding all that local by-laws can do, and undoubtedly in a few months become foci, if not of disease, yet of poor health, and the inmates of such houses become increasingly unfitted to struggle against disease. . . . . I am not unmindful of the fact that a great advance has been made in artisans' dwellings, which now have the greatest possible attention given to their construction, but as soon as you get just above the artisan class, the poor struggling clerk or the shopman and the small tradesman, you will find that the dwellings themselves are not one whit better than they were fifty years ago, and the surroundings of these dwellings are infinitely more confined than used to be the case. The methods of construction which are good and necessary in a hospital are equally good, and, to my mind, almost as necessary in an ordinary dwelling-house, and they could be provided in the latter at a very small extra outlay beyond what is generally spent. The fact is, that of late years the working man has monopolised the attention of the benevolent and the charitable. I should like to see some capitalist take up the cause o the lower middle classes, and start a company for the erection of middle-class dwellings at reasonable rents, and as our municipalities are going in for commercial speculation they might find this not one of the least profitable. I know that the Artisan's, Labourer's, and General Dwellings Company, which has gone on these lines, has always managed to pay a dividend. Local by-laws have done much to rectify flagrant abuses, but you cannot frame by-laws to meet all small details, and the worst of it is that what by-laws specify as a minimum in the way of requirements, is always taken by the speculative builder as the maximum.

The fact is, we want fewer hard and fast lines laid down, and literal specification of requirements in our Building Acts and by-laws, but more discretion left in the hands of those who have to carry out these legislative enactments. This opens up what is, to my mind, one of the most important questions relative to the health of the people—I mean the standing and qualifications of inspectors and other officials, who have practically the whole matter in their hands, from the highest to the lowest, from the District Surveyors who have to carry out the provisions of the Building Act of a great city like London to the small building inspector of a rural district council. And it seems almost impossible to get local Councils to appreciate this. What do we see all over the country? A local builder, who has failed in business, gets some kind friends to propose him as building inspector, or perhaps even surveyor, to the local Council. Be he as honest and painstaking as possible, how can such a man enforce to the full regulations which he has been for years trying to evade as far as he could, and the necessity for which he is probably very doubtful of? He will inevitably incline to leniency, which will soon become laxity, and many of the minimum provisions of the Acts will not be enforced. It cannot too often be insisted upon that the national health is the most important factor in national life, even when looked at from the lowest pounds, shillings, and pence point of view—and that it would pay in the long run many times over to raise the salaries of the various building inspectors, &c., so that you would ensure the occupants of the posts being men of position and above all underhand influences. I do not know whether it would be possible for the Local Government Board—which I know is already an overworked department—to add to its burden of work, but, in my opinion, the appointment of every health officer in the country should be subject to the approval of the Local Government Board, and the amount of his salary, and then you might make the Acts themselves which have to be carried out much more elastic. The unhealthy conditions in which so many workers habitually live affects the death rate appreciably, but it does a great deal more than that—it lessens very materially the productive power of the community, and no one can estimate the cost to the country of the persistence of such conditions.

Now let us look somewhat more in detail at the development of a new suburban estate, where the roads and sewers have been made, and where the houses would probably let for about 20*l.* to 30*l.* per annum. When finished these houses would appear to an ordinary passer-by to be of very attractive elevation. There would probably be on the ground floor, or perhaps even carried up to the first floor, an octagonal bay window with stone jambs and head; small stone columns to a slightly-recessed porch with quite elaborate carved capitals; slated roof with tiled ridge; and, inside, stoves with tiled sides and elaborate cast-iron or enamelled slate chimney pieces—and people would say, 'How extraordinarily cheap!'

But let us look a little more closely, and follow up step by step the action of the builder who has erected these attractive bijou residences, having taken a number of plots on lease, and who desires to make the speculation a good thing. He will take care first of all to get his plans—drainage and all—passed by the local district council; then he sets to work merrily. We will suppose that the site has been pasture used for grazing purposes and that the subsoil has not been touched. The first thing the builder will do is to make some trial holes and ascertain if there is any gravel or sand. If this exists, he will be sure to provide a cellar; and, in addition, unless he is stopped by the freeholder, he will make extensive excavations in the space to be allocated to backyards and gardens and get out all the gravel he can. Now, this ought to be absolutely prohibited, because the ground made up over the hole excavated (even if this is not filled in with offensive stuff) will certainly not be so healthy as if the soil remained undisturbed; but so long as the house itself is not built on this made-up earth the local authorities cannot interfere. But suppose the soil is clay—waterlogged or not, as the case may be. He will then dispense with a basement, as costing too much, and he will take off the turf and a few inches of soil under it, and he will proceed to comply with the local Act by laying 6 in. of so-called concrete over the site to be built on. If he is not very carefully looked

after, he will let this concrete act for the foundation of his walls, none of which will be more than 9 in. thick, but he may take the footings of his walls a little lower down. Now, what is the concrete composed of? There will be a certain amount of lime, a certain amount of ballast, and a very uncertain amount of what looks suspiciously like garden mould mixed with it. If the freeholder's architect sends down to see how the work is progressing, and asks questions about the ingredients, he will probably be told that the dark stuff is not garden mould—far from it!—but a most excellent substitute for sand, consisting of road-scrapings. Now, I am not prepared to say that, in districts where macadamised roads are laid with granite, *thoroughly washed* road-scrapings may not form by no means a bad ingredient for concrete or mortar, but the thorough washing is an essential, as otherwise horse-droppings and all sorts of filthy materials will be mixed in. But I have never seen this stuff carefully washed in such a case as I am describing; and, in my opinion, for all intents and purposes as far as the main object is attained of excluding ground-air from the house when finished, such a layer of concrete is practically useless. The finished level of the ground floor will probably be not more than two steps, or 12 in. above the ground level; the underside of the joists will be just the bare minimum above the concrete layer; the air bricks to ventilate the space under the ground floor will be placed so low down in the face of the external wall that they will be likely soon to get stopped up and be useless for their purpose, and dry rot will probably ensue; and the floor boards of the house will not be grooved and tongued, so that the joints will soon gape. The importance of excluding ground air cannot be too strongly insisted on. You may have your drains perfect, but if the warmer interior of a house is continually sucking up the air from the soil, which is liable to contamination from leaking sewers, gas-pipes, and all sorts of organic impurities, the effect on the health of the inmates cannot but be deadly. All this would be avoided if a thin layer of asphalte were laid on the concrete, and the whole of the ground floor were laid—as to the rooms, with solid blocks of wood, and as to the passages with cement or cheap tiles; and the extra cost of finishing the ground floor in this hygienic manner would not, in my opinion, be 1 per cent. on the cost of the house.

The walls of the house are rapidly run up, and it is desirable not to inquire too closely into the composition of the mortar, but what about the workmanship? The joints are not well flushed up, the consequence being that the damp caused by rain gets completely through the wall and damages the plaster, and is an inevitable source of catarrh, rheumatism, &c., and where the walls pass through the roof, a poor cement fillet will soon begin to shrink away from the bricks and let water in which will do more damage. Then the joists of the first floor are almost invariably carried on a weak stud partition, the sill of which, on the ground floor, rests on a half-brick wall; this partition is not trussed, and in many cases it is a perfect marvel how it manages to carry the joists. But these stud partitions have greater drawbacks than this; the space between the plaster on each side forms a run for mice and other vermin, and a receptacle for stagnant air which can never be purified, and retains the germs of all kinds of diseases which may have attacked the inmates. Furthermore, the plaster is never taken down to the floor level, but is stopped above the grounds for the skirting, and consequently the only separation between the rooms for 9 in. or 12 in. above the floor consists of a couple of 1 in. boards, and I have myself seen liquids spilt in one room run under the skirting into another, where, owing to shrinkage, the floor boards are no longer tight up against the skirting. Now, how by any possibility can a building constructed in this manner be healthy? For some few months after its erection perhaps no particular harm is done, but as soon as some infectious disease has been nursed in it contamination commences, and in a few years, my firm belief is, such a house becomes what in a hospital ward would be termed permanently septic, and it is almost impossible to get it sweet. Everyone must have noticed in visiting many a moderate-sized house the stuffiness which is apparent in the rooms. This means that for some time past the air has been in an impure condition. Now, how easily might this state of things be rectified. A half-brick wall in cement would cost no more than the stud partition, and would be a far more sanitary piece of construction, as affording fewer stagnant corners for air, and at any rate this half-brick wall would form a far more solid separation between the rooms; and on the upper floors, when a thin light partition is required, some of the new inventions of solid partitions, fireproof and vermin-proof, would avoid the necessity of stud partitions. The space between the ceiling and the floor is another harbouring space for dust, dirt, and germs of all sorts, but I fear it would be too much to expect that small houses should be built with solid iron and concrete floors, with the boards laid direct on and nailed to the concrete. In France, even in small houses, the upper floors are laid with concrete and tiles, and there can be no difference of opinion that such floors are far more sanitary than ours.

What is no doubt badly wanted is a cheap form of solid floor. A new solid concrete floor, which has the merit of cheapness, has recently been patented; it is known as terrast, and can be used with ordinary wooden joists. This floor consists of some metal lathing laid over the joists and sagging down slightly between them; over this is laid a layer of thick brown paper, and above this about 1½ in. of coke breeze concrete, to which, of course, the ordinary floor boards may be nailed. I know nothing about this floor, but it at any rate is an attempt to diminish the cost of a solid floor in the upper stories. But would it be very repugnant to our notions if the plaster ceiling were omitted and the joists of the upper floor shown? You find this form still existing in Yorkshire and other parts of the country; or if you do not like to show the joists, put two large beams across the room and cover first with 2½-in. planks, and then a cover floor of ordinary boards. I have seen this done quite recently, and a very good effect it has. The great objection is that sound passes through such a floor very easily, but the omission of the ceiling would pay for some good non-conductor of sound being laid between two layers of floor boards. Moreover, in the case of small dwellings such as I am thinking of, which would be generally occupied by one family, the passing of sound between two floors would not be so objectionable as in tenement houses. Of course, something to serve as a skirting is needed to stop the plaster next the floor and to prevent it from being damaged, but a cement skirting could easily be used on brick walls, or a solid fillet of wood if preferred. Now let us glance for a moment at the plumbing arrangements. If a bath or a water-closet be placed on the first floor it is almost certain that the supply cistern will be placed in the roof, where it is very difficult of access. Now in any large city, the inside of the roof of a small speculative-built house covered solely with slates and battens is one of the dirtiest places that can be imagined, and yet here the cistern is to be found which supplies water for all drinking and ablutionary purposes to the whole household. In the first place, why is a store cistern needed at all? The old intermittent service is happily well nigh obsolete, and with a constant service from the mains, I see no reason why every fitting should not be supplied direct. Waste goes on equally with leaky taps, whether they draw their water direct or from a cistern, and, in my opinion, a leaky fitting would be more easily found out and remedied if directly attached to the main than otherwise; and moveover, if the supply is direct from the main, much of the cause of leaky taps could be avoided by means of a good governor regulating the pressure and placed on the pipe leading from the Company's main to the house. The pressure in the mains is necessary because the water has to be forced up to a certain height, and it is this great pressure which so soon spoils the taps. When a tap is turned no one wants a rush of water—just as if it was coming from a siphon. I have often wondered why some one has not invented—perhaps they have, though I have not come across it—a regulating governor similar in action to the regulating valves which are used for gas or the transformers for electrical energy. But *if* cisterns are to be used, then it is imperative that they should be placed in an open and airy situation, so that they can always be inspected and cleaned out at intervals.

It has been urged that there shall be no roof properly so called at all, but that the building should terminate with a flat, and certainly, in town, where a parapet generally hides all appearance of a roof, and gives a monotonous straight skyline, there can be no possible reason why a flat should not be formed, and if this were cemented and covered with asphalt no more sanitary covering could be provided; but in suburban houses of a small type, I think the flat roof would be horribly monotonous, and that we must adopt roofs of a fair pitch, but the more space in the roof that is given to the rooms the better. I might mention several other forms of unsanitary construction, but I hope I have said enough to show what great improvements are possible. Drainage *per se* I have not touched upon, because the subject has been treated *usque ad nauseam*, and so much attention is given to drains that the greatest abuses connected with drainage have ceased to exist; but, in my opinion, it is a mistake to think that having the drains all right makes the house sanitary, and I fear this is the position too often taken up not only by the builder but by the sanitary inspector, and I should like to see everywhere a much wider view prevail of what is required for sanitary house building. Hospitals and infirmaries which are now built at a cost, as we have recently heard, of 500*l.* a bed, can take care of themselves because every detail of their construction is thoroughly well thought out, and the same applies to the large blocks of artizans' dwellings which nearly all our municipalities are now erecting, though I may have something to say about these from another point of view; but how can we secure improvement in the kind of dwellings of which I have been speaking, the inmates of which form the great mass of the workers of the nation? It is no new gospel I am preaching. In the past dozen years or more much that I have said to-night has been urged, far better than in any words of mine, at Hygiene Congresses and Sanitary Institute meetings all over Europe, and yet so little has been done; and why? Expense is generally considered the great obstacle, but I cannot help feeling that there is a greater one which is this: the people who build the houses are so rarely those who dwell in them, and there is so little fixity of tenure. I am no socialist, but I cannot shut my eyes to the fact that the improvement of the dwellings of the people is a question which is intimately bound up with that of the ownership of the land on which they are erected, and until we can get rid of the middleman in the shape of the speculative builder, who only cares to put up his buildings at the lowest possible cost, we shall never improve the separate small dwellings of the people. How this speculative builder can be abolished is a question of political economy which scarcely comes within the scope of this paper, but when we see what is being propounded in Ireland as a cure for all the ills from which the peasantry of that country are suffering, I think we get a hint of a possible solution.

I see no reason why the lower middle classes of this country should not be trusted to fulfil their obligations as well as those in the sister isle, and although it may not yet have come within the sphere of practical politics, I should not be surprised if, in the next generation, the Government were to take up the question of loans to small householders for the purpose of helping them to buy their own freehold sites and build their own houses, and if this were done we should soon see a vast improvement in the construction of the people's homes. My own belief is that such loans would be speedily and easily repaid. I know, as a fact, that small private houses, letting for, say 25*l.* per annum, are built and sold by the builder for 275*l.* An extra expenditure of 10 per cent. would convert an insanitary house into a healthy one, and an advance of one half the cost of the building and site to the intending householder could be repaid easily, principal and interest, in say twenty years. The State would, in fact, put itself in the position of a large building society. But this is wandering from the subject of my paper.

I have now dealt with various points connected with the construction of a house, and we have seen how some methods of building tend to promote the health of the inmates, and others to prejudice their well-being. The matters are concerned with the practical scientific side of architecture, and I would now ask you to consider a somewhat more difficult question, which is: how far is the health of people affected by the artistic or the æsthetic

side of architecture; by matters which are not constructional, but are connected with site, arrangement of plan, surroundings, style, and design? Here, again, I would quote the old adage, "Prevention is better than cure." As I pointed out in the early part of my paper that methods of construction which are deemed essential in buildings devoted to the cure of disease must be equally beneficial for all dwellings, so you will find it to be with the matters which we are now considering. I need not dilate on the question of site, for every one knows that a wet, damp site, or one subject to inundations, can never be healthy. It is the pressure of population which brings about the utilisation of low-lying, bad sites for human habitations, and I feel confident that there ought to be a power of prohibition against the erection of any houses, however small, for permanent occupation on sites which are manifestly unfit for the purpose, or if houses are built on such sites they should be raised on arches in order to make the principal or ground floor quite dry. Then again, as to surroundings, how is it possible for people to keep their health if they have never anything but dull dreary miles of streets to look at every time they come out of their house? I cannot imagine anything more depressing than the surroundings of some of the poorer quarters in many of the great towns of the north of England or in London, and bear in mind that mental depression inevitably reacts on the physical health in a way that is too often lost sight of.

I read very lately that in the opinion of an eminent oculist, a great deal of the defective eyesight which is annually becoming more prevalent in towns, is due to the fact that these urban dwellers look so seldom on the pleasant restful green of the woods and fields, and so constantly on dull bricks and mortar, and if this opinion is well founded, it might undoubtedly make us give more consideration to the prominent tints which we use for both the insides and outsides of our dwellings. The condition of the brain is seriously affected by the state of the nerves of the eye, and the undoubted increase in diseases of the brain of late years may possibly depend, not only on the hurry and bustle of the daily life of the average business man, but also upon the dull, gloomy, repulsive nature of his outlook for so many hours of the day. Just as light causes us to feel cheerful and warmth makes us feel comfortable, so I believe it will be found that colour in soft graduated tones has an immense effect on our well being. Staring, garish, inharmonious tints must have a somewhat similar effect through the eye on the brain, as loud cacophonous sounds have through the ear, and, strange as it may sound, I firmly believe that it is almost as essential for the construction of healthy homes that the tints of the woodwork and the wall coverings should be considered as that the drains should be properly laid. Why is it that, however luxurious and well furnished a house may be, we frequently feel a sensation of fatigue when we pass an hour or two in its rooms, whereas in another we feel restful? Often, I believe, because the nerves of the eye are strained and wearied. And here certainly is an opportunity for the builder to adopt sanitary methods rather than unsanitary ones at practically no expense at all. Instead of the haphazard arrangements of wall-papers, without any consideration of the aspect of the room and the quantity of light which it enjoys, a very little knowledge and thought would show that neutral tints are desirable in rooms which get a large quantity of sunlight and warmer tints for north facing rooms. This consideration leads me to my next point, viz., the enormous importance of paying proper attention to aspect. The immense value of sunshine, especially in these northern latitudes, cannot be too strongly insisted upon, and in this respect it appears to me that the large blocks of artisans' dwellings which have lately been erected in so many cities lamentably fail. As a rule, particularly in the cases where the municipalities build these dwellings, and the cost is charged to the rates, care is taken that all the blocks have an ample air space between them, but even with the London County Council, whose artisans' blocks are excellently designed, well-built, and with plenty of air space, the height to which they are carried makes them dull and somewhat gloomy. Of course, here again the question of cost comes in, and generally where old buildings have to be pulled down and insanitary areas cleared away, the capital expenditure becomes very large before a brick of the new buildings is laid, and in order to accommodate a sufficient number of families to obtain a rental that will give any return at all upon this expenditure, the buildings must be carried to a great height. I do not believe this can be done without prejudicially affecting the health of the inmates, especially the children. No doubt the conditions of life are infinitely superior to what obtained before, and the enforced cleanliness and general submission to regulations cannot but have an excellent effect on the dwellers in these buildings; and the mortality is admittedly low. But I should be sorry to see these huge blocks multiplied in the heart of our great cities. The object should be to get the workers away from their work when it is finished by increasing the facilities for quick and cheap transit.

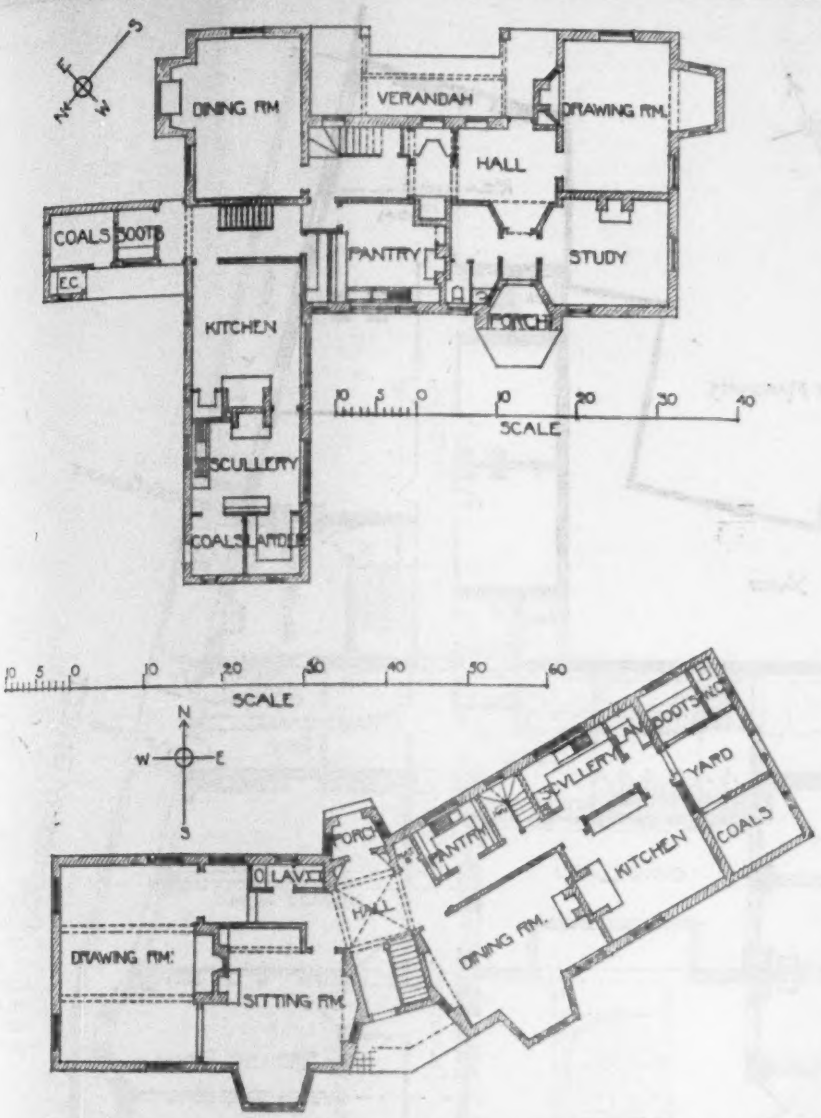
The startling development of electric traction, which is the most marked feature of these last few years, offers a solution of the difficulty. I do not think the time is far distant when it will be the exception, and not the rule, for the workers to live in close proximity to their work when this is performed in crowded areas, and this would result in an enormous amelioration of the average health of the people as well as a fresh increase in the output of their work. There can be no doubt that the success of the bold experiment of which such places as Port Sunlight are the result, will encourage other large private firms to follow this example, and that manufacturing industries will have a tendency to be carried on at a distance from our large towns; but there must always be a large army of workers connected with the distribution and not the manufacture of commodities who will be compelled to carry on this work in the daytime under somewhat depressing conditions, and for these will come salvation in the shape of the tramway or the light railway. It is in this direction, combined with the erection of good small houses, amid bright and cheerful country surroundings, that I hope municipal enterprise will soon be turned. If some such policy could be carried out, just think how far-reaching would its results be. I sometimes look at the costly, well-equipped, Board Schools, which have been erected in thousands during the last thirty years, and when I see these places, as they often are, in the most dingy and depressing surroundings, I wonder how the children who attend these schools can possibly grow up healthy. Asphalted playgrounds, surrounded often by high walls, where the only view is of bricks and mortar, are not the ideal training-ground for the future mothers and fathers of the people. You have only to compare the pale faces and weakly forms of the town-bred children with the ruddy bloom of those who are in the country, to see what an advantage the latter have, and I look forward to the day when all the elementary education will be carried on away from the large towns. You will think that I am wandering from my subject, but while on the question of schools there is one matter which I have very much at heart, and which I have more than once alluded to in other places, and this is directly relevant to the subject of this address. I have been speaking of the outer surroundings of our elementary schools, but turn to the inside; these buildings are well-built and well-found in all respects, but are they beautiful? As a rule, perfectly plain walls, with no decoration on them, are all that you will find. Could not this be altered and improved at practically no cost at all to the ratepayers? There is scarcely a large city in the kingdom that has not its art school, where most excellent work is done in painting, modelling, iron work, &c., founded by the ratepayers and under municipal control. Why should not the art school students be employed in decorating the Board Schools? It would be far better practice for a student than merely designing and painting a coloured decorative frieze to be placed he knows not where, that he should, of course under the guidance of the art master, take an actual classroom and decorate it well. Or why should not a modelling student design and carry out some plaster enrichments or a little statuette for a niche? It might all be done as part of the work of the session, as I said, at no appreciable cost at all. And just think of the effect on the Board School children of spending so much of every day in surroundings which are bright and cheerful and which would teach them to know and appreciate what is beautiful! Their work would be better done, their characters improved, their minds trained unconsciously, and undoubtedly their physical health would be better. I might considerably amplify these remarks, but I cannot do better than conclude with a quotation from the old Greek philosopher, Plato, who says: "In the case of our artists, the bad habit must be stopped of depicting in statues or buildings or any other artistic production, what is coarse or illiberal or ugly. If a man cannot refrain from this, we must forbid him to produce anything, lest our children, if reared among images of evil as in a bad soil, drawing their impressions one by one from many sources every day, may unconsciously establish an evil precedent in their own souls. We must rather seek for artists to trace out what is beautiful and noble in nature, and thereby enable our children, like plants in a good soil, to be assisted by their environment, so that whatever meets eye or ear from these beautiful works may, like a health-bearing breeze, lead them unconsciously from their earliest years to love and be in accord with beauty and reason." These words are as true now as they were 2,500 years ago.

It is impossible to over-estimate the good which has been done in the last thirty years by the Sanitary Institute, by its examinations, its publications, and not least by its Congresses, which do so much to spread abroad in all parts of the country a knowledge of the principles of sanitation; and if its founders could see the results achieved, they would feel fully repaid for their exertions. But there must be no cessation of activity. Very much has been done, salient abuses have been abolished, and an excellent foundation has been laid, but the superstructure has yet to be erected. And everyone can help in the work. It cannot too often be dinned into the ears of the governing bodies that upon the health of the people depends the wealth and well-being of the nation, and the suggestions which I have thrown out will, I hope, show you that the health of the people depends upon very much wider considerations than the mere regulation of drains and ventilation, and that architecture, not only on its constructural side but on its highest and artistic side, has a closer and more intimate connexion with hygiene than might be at first sight supposed."

ENGINEERING SOCIETIES.

The Junior Institution of Engineers.—The summer meeting of this Institution, of which Colonel E. Raban, C.B., Director of Works of the Navy, is President, is to be held at Sheffield. The proceedings will be opened by the Lord Mayor, the Right Hon. J. Wycliffe Wilson, J.P., on the 17th inst., and he will receive the members at the Town Hall. Messrs. Davy Brothers' Works will then be visited, and afterwards those of Messrs. Hadfield's Steel Foundry Co., at Tinsley. On Tuesday, the 18th, there will be an excursion to Haddon Hall and Chatsworth. Messrs. Charles Cammell & Co.'s works will be visited on Wednesday morning, and in the afternoon, Messrs. J. Dixon & Sons'. Thursday will be occupied by an excursion to Castleton, and on Friday are to be seen the Toledo Steel Works of Messrs. J. H. Andrew & Co., and the Suffolk works of Messrs. T. Turner & Sons. The summer dinner takes place in the evening at the Royal Victoria Hotel, Sheffield. Mr. Ernest King, Messrs. Mellowes & Co., Corporation-street, Sheffield, is acting as honorary local secretary.

Decline of Building Activity in Christiania.—Mr. Consul-General Dundas writes to the British Foreign Office:—"Since 1898, building activity in Christiania has declined. The number of principal buildings reported completed in that year was 1,756, while in 1900, 1901, and 1902, the number was 764, 922, and 884 respectively. Of new dwelling houses in 1902, 158 were reported completed, and seventeen business and factory buildings. A still greater difference appears in the number of building undertakings sanctioned. These amounted last year to 681, compared with 900 in 1901. Naturally this stagnation in the building trade exerts an exceedingly depressing effect on the conditions of life in the city. For not only a large number of workmen go unemployed, but many trades and industries, which are largely interested in the building industry, are inactive. This state of affairs consequently had its effect on property, in which little business was done, and little capital expended in the purchase of property. The total value of the transactions in property, which in 1897 was estimated at 4,143,250*l.*, has, in the last two years, been estimated at from 220,000*l.* to 250,000*l.* in each year."



Plans of Houses at Shepherd's Green and Great Shelford (see issue of August 1).

HOUSES AT SHEPHERD'S GREEN AND GREAT SHELFORD.

THESE are the plans of the two picturesque little houses by Messrs. Green & Dickie, the exterior views of which were published in our last issue. It was impossible to find space for the plans owing to the number of other text illustrations in last issue; but we give them now so that they may be compared with the illustrations already published.

THE SEASONING AND PRESERVATION OF WOOD.

ON Wednesday, June 10, a lecture, entitled "The Seasoning and Preservation of Wood," was delivered by Mr. Hubert Higgins, M.A. Cantab., at the Society of Arts, John-street, Adelphi. The chair was taken by Mr. William F. King, the President of the Institute of Builders, who, in a short speech, introduced the lecturer. Mr. Higgins said he proposed briefly to recapitulate the main problems that had suggested themselves to him during a long series of experiments, and not to make more than a brief reference to the purely theoretical side of the subject. Wood had been treated in all sorts of ways with varying results. Experiments had been conducted by Governments and individuals from the earliest historical times. Two methods seemed particularly to stand out in the history of the treatment of wood, viz. treatment by heat for seasoning purposes, and impregnation by creosote for rendering it antiseptic and thus preserving it. With regard to the former method (viz., by heat), it was well known that charred wood was very durable, and many more or less unsuccessful attempts had been made to preserve wood by partly burning or charring it. But wood resents any very violent change of temperature by warping and cracking. Proceeding, he said:—

"I need scarcely tell you that wood consists of the solid matter cellulose, lignin, &c., permeated with a vast number of fine, almost capillary, tubes. The knowledge of this fact has been utilised in a very ingenious French process—making use of the property that an electrical current has, when passed along capillary tubes, of inducing circulation. This process consists of placing one end of the trunk of a tree in a resinous solution, and passing an electric current through the trunk, the resinous solution entering at one end, and the sap being driven out at the other. It is a very ingenious process, but I have not heard that it has been largely used in practice. To my mind the points connected with seasoning are mainly as follows:—

To make careful and exhaustive inquiry into the difference between seasoned and unseasoned wood;

To decide whether wood can be so altered by heat, as to produce the same effect as natural seasoning produces;

To investigate the nature of the combination of the solid structure of wood with water;

To discover the nature of the micro-organisms growing in wood, and the laws governing their growth.

The main characteristics of green or unseasoned wood are:—

A rough feeling when cut; dampness; contains more water or sap than seasoned timber;

It cannot be planed as well as seasoned wood;

Liability to warp and shake with changes of temperature.

It is somewhat more putrescible than seasoned timber; in other words, there is not so much cohesion between the fibres of wood and its particles. Our problems, then, are to so alter wood that it does not contain so much water and that it may resemble time-seasoned wood as much as possible; also to see that the process does not destroy the nature of the wood by interfering with the adhesion of the fibres one with another.

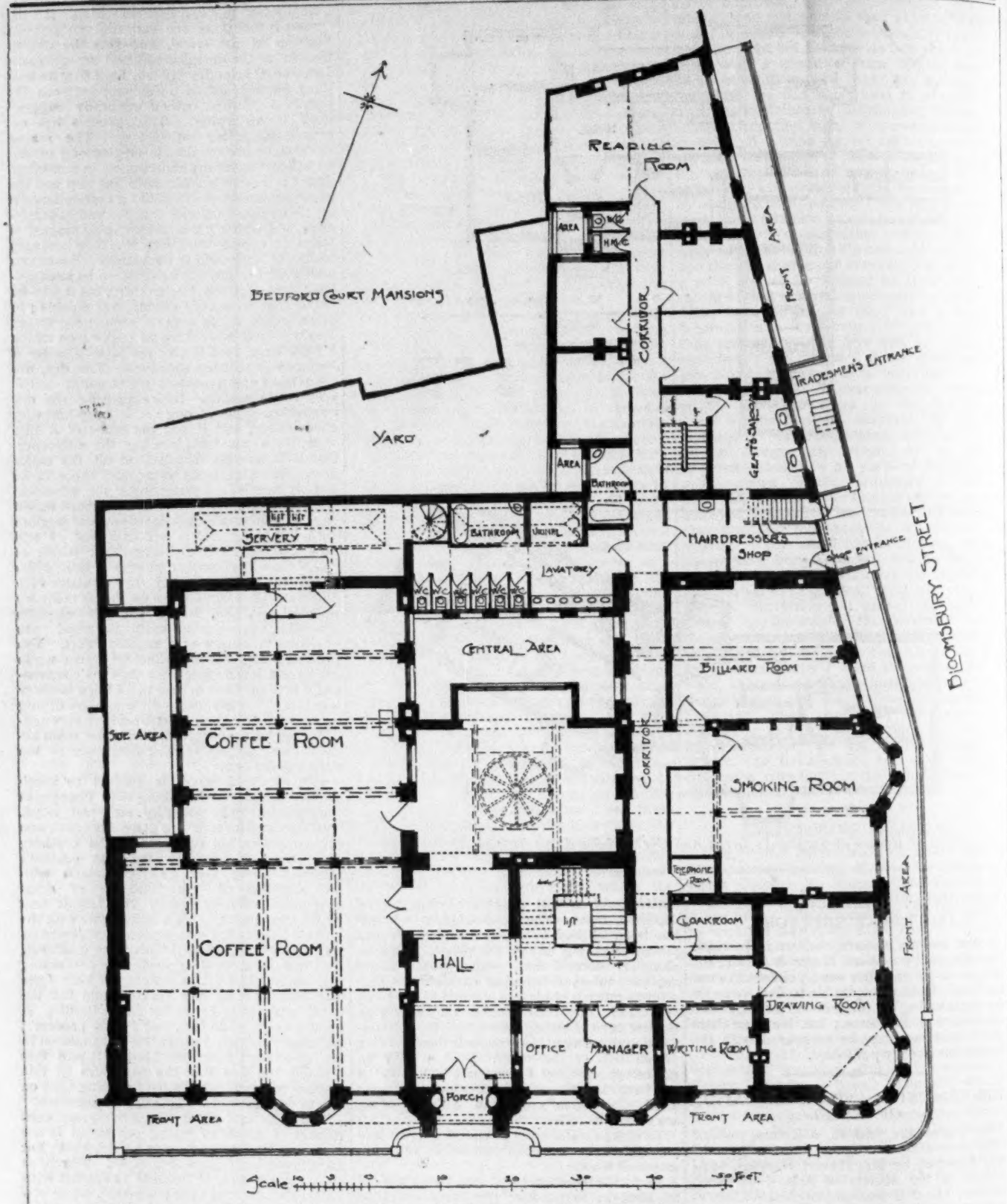
It is very difficult to know what changes actually take place in time-seasoning. All one knows is that there are very different physical qualities of the wood, and that the characteristics of the unseasoned wood are gradually lost, so that scientifically it is hard to state anything but the actual differences between the two. A method which naturally suggests itself is air-drying. This process has not proved altogether satisfactory. The reason for this, in my opinion, is one, among others, on which I based my experiments in seasoning. There is in combination with the sap and the growing portion of the wood a certain amount of albuminous material that is readily putrescible, and which has a considerable amount of water in combination with it. Now ordinary white of egg, which is mainly albuminous matter and water, can be dried in its uncoagulated state at a low temperature, but it will be found that it is very friable and soluble; in other words, it has a great affinity for water. You will find by looking at a specimen which I have here, that if you put it into water it becomes practically dissolved. The dry, uncoagulated egg possesses no strength and is very easily broken. Now supposing you dry coagulated white of egg: it is crisp and very hard indeed, and if you put some of it into water in a test tube, you see the difference, that it is scarcely dissolved at all, the water above being perfectly clear, and there is no sort of mixture of water with the albumen. Now here is a bit of the familiar hard-boiled egg, in water, which also shows no mixture with the water, and is not dissolved. I will now produce a little coagulated white of egg. [Here the lecturer poured a little white of egg into boiling water.] It coagulates very quickly, and is familiar to us in the ordinary poached egg. So, then, if you can coagulate the albuminous constituent in wood you obviously produce a very marked effect. You produce a very different effect by drying white of egg at a low temperature, than by coagulating it first and then drying it. I hope to show you that this is the point on which the drying process which I shall describe differs very considerably from air-drying, and to my mind accounts very largely for the difference in the results of the two.

Hot air-dried wood is subject to much greater warping and shaking with changes of temperature than naturally seasoned wood. The shavings from it are generally short, and the wood does not come out of the crushing and breaking tests as well as ordinary seasoned wood does. In connexion with this question of the hardness of dried coagulated albumen, when Mr. Lovatt first began experimenting on a large scale with the process I devised, I was somewhat alarmed on learning that the wood blunted the machines, for I had no method or device for preventing that result. But I was relieved to hear from him that he was very pleased, and that the wood was really better for being harder. A great point is, therefore, that in the process I will describe later, I coagulate the material in the wood and therefore harden it, and that explains the fact that the machines in this instance were rather blunted by being used on this wood seasoned with a high temperature.

You may look upon the albuminous constituent of wood as acting somewhat in the same way that starch does in a shirt-front; but there is one very great difference. Starch, as we all are aware, if brought in contact with water, absorbs it at once; whereas, when you get coagulated albumen, as I have shown you here, it has very little affinity with water.

I will now deal with the nature of the combination and relations of cellulose with water. The main question I found suggesting itself for explanation was: "In what way does unseasoned wood behave differently from seasoned?" This question is very largely concerned with this curious combination of wood with water. There are two forms in which water is found in combination with wood. One is chemical, and the other is purely physical—that is to say, that a union like that of a sponge with water is a purely physical one, but the union between the water and the white of egg, in the experiment which I made just now, is a chemical one; this white of egg contains an enormous amount of water, but is not easily separable from it, and is in chemical combination with it. Take the water in our own bodies. We consist of something like 80 or 90 per cent. of water, yet we are absolutely unable to wring a man out and squeeze water out of him.

Continued on page 163.



Kenilworth Hotel, Great Russell-street.—Plan.

Illustrations.

COMPETITION DESIGN FOR CAPE UNIVERSITY.

THIS design, by Mr. E. Wimperis and and Mr. H. S. East in conjunction, was the one placed third in the recent competition.

The main idea of the scheme, in the view of the architects, was the provision of facilities for extension, while not losing sight of the fact that the building must stand alone and as a complete unit, without being unsightly, until the time when the extension could be carried out.

This we think they have managed very well, as will be seen by the plan.

THE KENILWORTH HOTEL, GREAT RUSSELL-STREET.

The hotel, of which Mr. G. Waymouth is the architect, was fully described under the head "General Building News" in our issue of May 30 of this year, so that we need not here repeat the description. A plan is appended.

The building stands at the angle of Great Russell-street and Charlotte-street, Bedford-square, the turret forming a conspicuous feature at the angle.

In general, hotel architecture lin London is of a commonplace and often tawdry description, and it is seldom that we find a building of this class which from an architectural point of view is worth illustrating. In the present case we have pleasure in publishing a hotel design which is free from these faults, and which, without attempting anything specially striking in architectural effect, is unpretentious, suitable, and in good taste, and in this respect forms a satisfactory contrast to some larger and more ambitious buildings of its class.

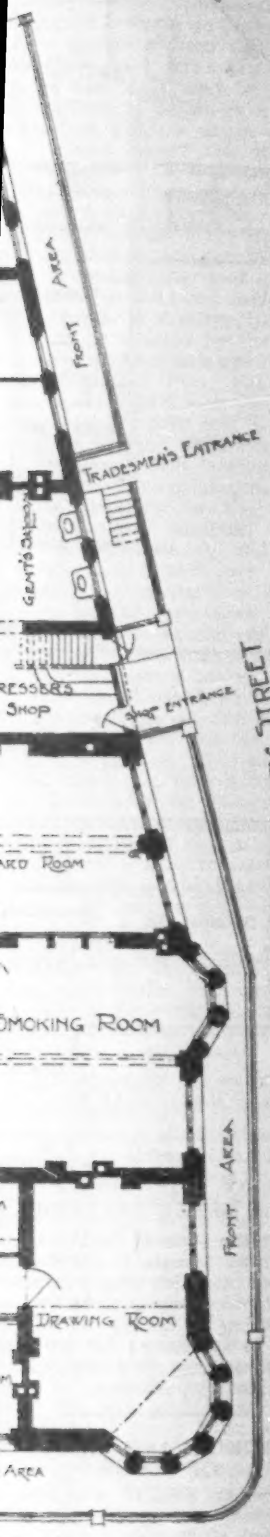
DESIGN FOR PROPOSED KURSAAL, CHELTENHAM.

THIS design was submitted in April, 1896, in a competition for a "Kursaal" proposed to be erected on the site of the old Winter Gardens. The elevations were to be of red brick with biscuit-brown terra-cotta and green Westmorland slating for the roofs. The design is by Mr. G. Harold Elphick, architect, of Broad-street House, E.C.

"SCULPTURE AT THE ROYAL ACADEMY."—In our issue of July 18, owing to an oversight in referring to the catalogue, Mr. Henry Pegram's bust entitled "Pensées" was erroneously attributed, under the title "Girlhood," to Mr. Bertram Pegram. The titles of the two busts, with the same surname attached to them, are close together in the catalogue, and hence the mistake.

PHOTO-LITHO. SPRAGUE & Co LTD 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

& Mr. H. S. East, A.R.I.B.A.



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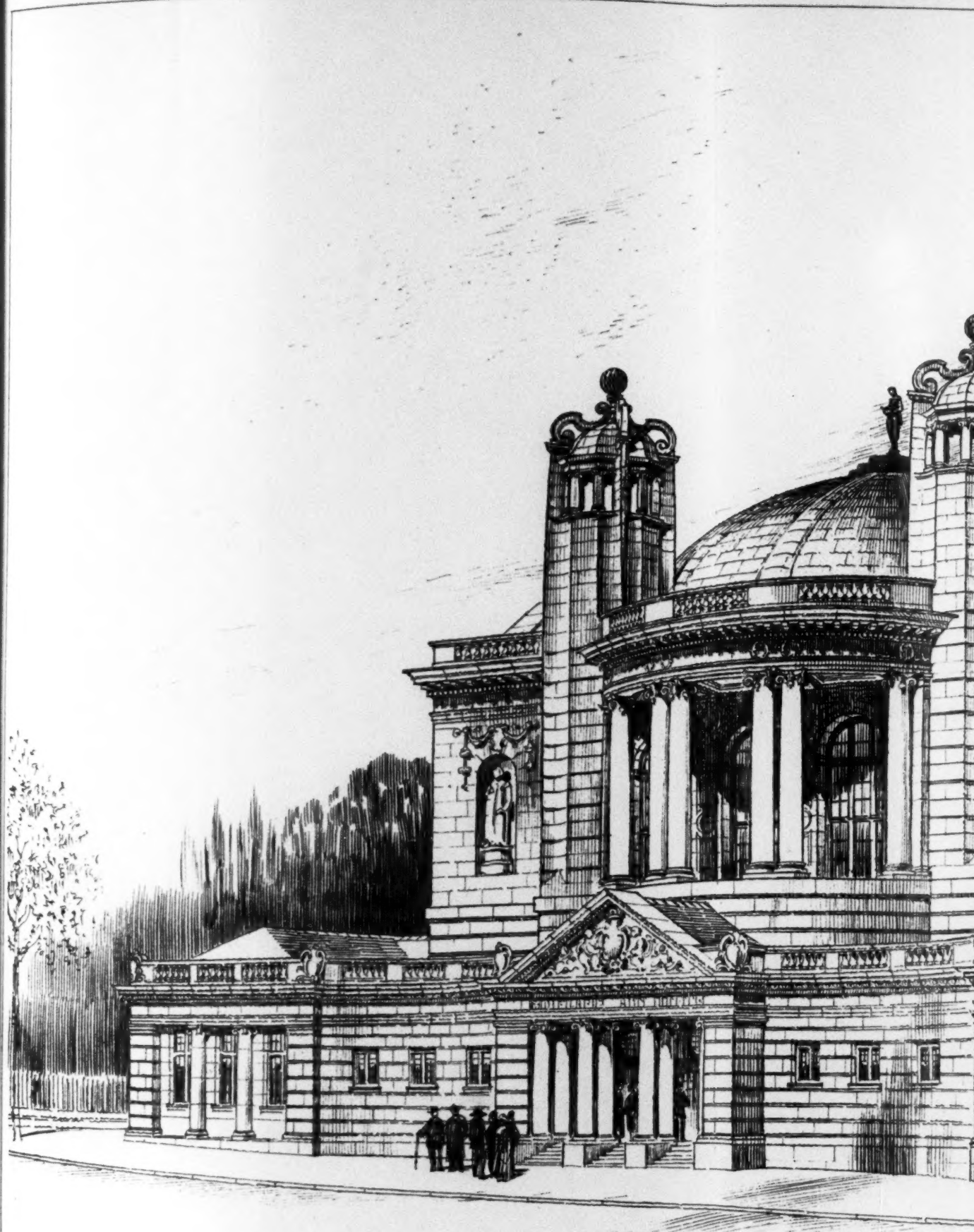

CAPE UNIVERSITY COMPETITION: THIRD PREMIATED DESIGN

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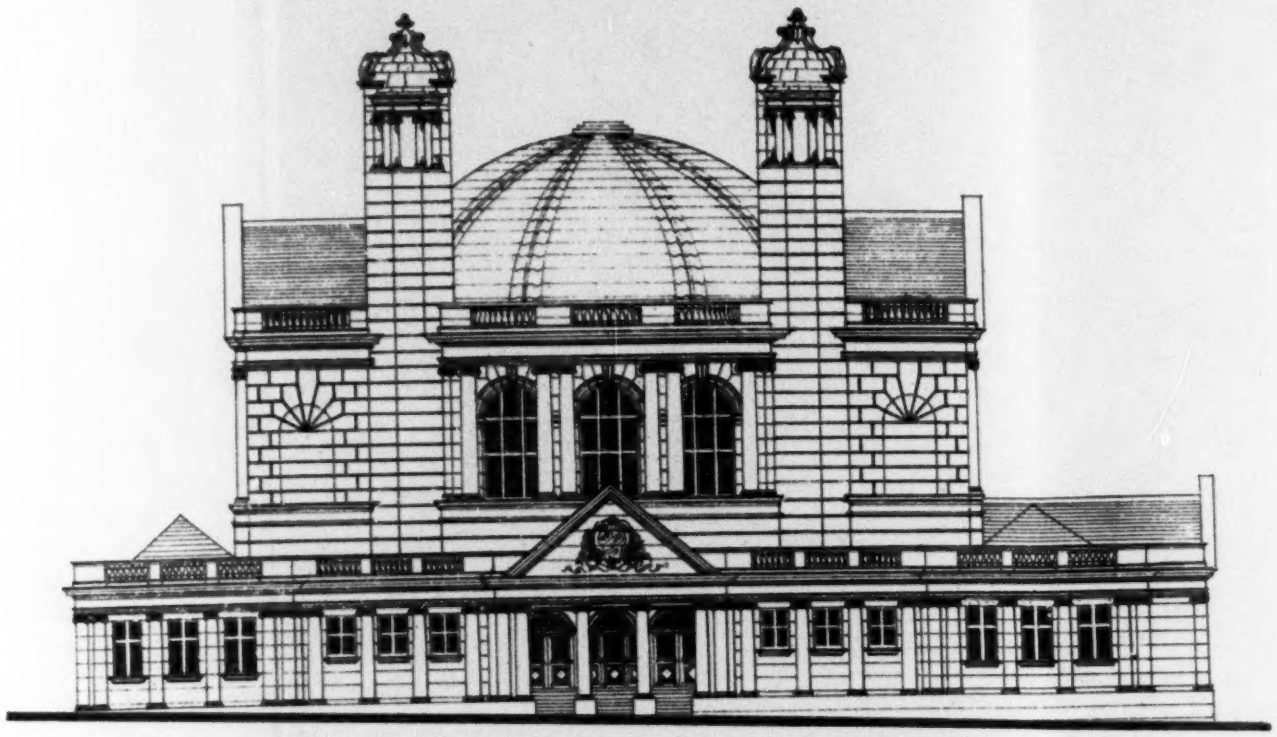
CD DESIGN.—By Mr. E. W. Wimperis, A.R.I.B.A., & Mr. H. S. East, A.R.I.B.A.



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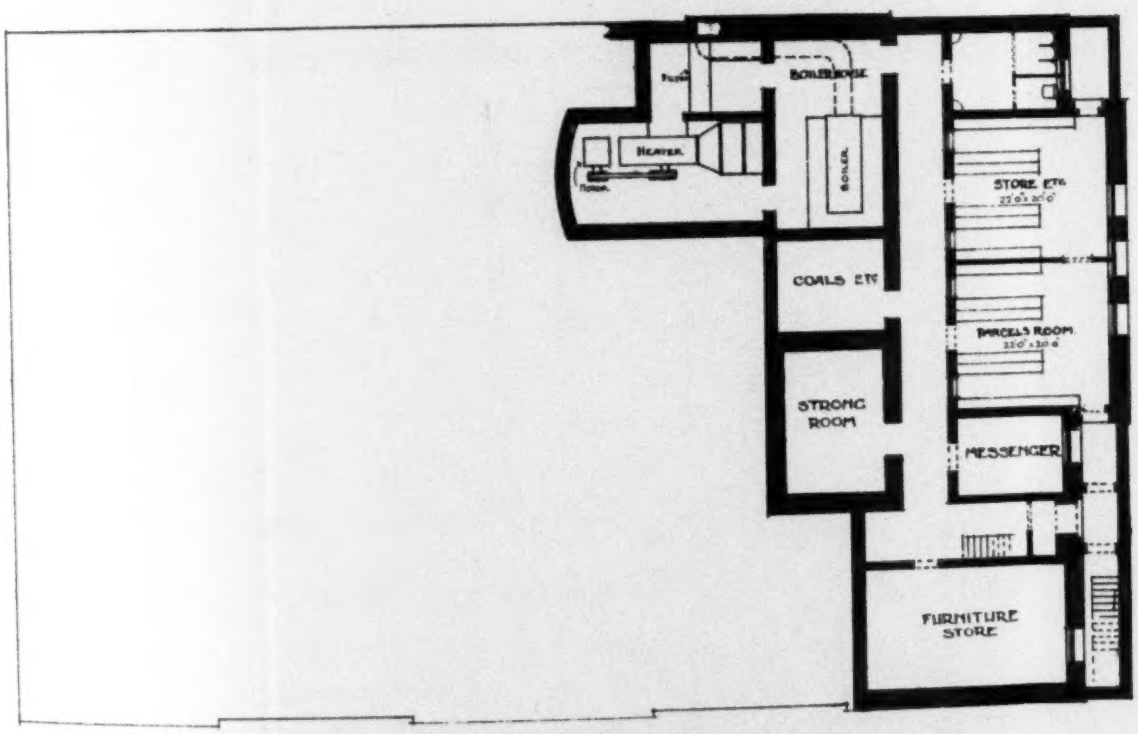
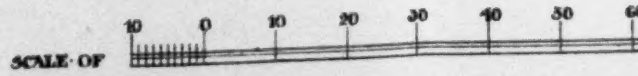
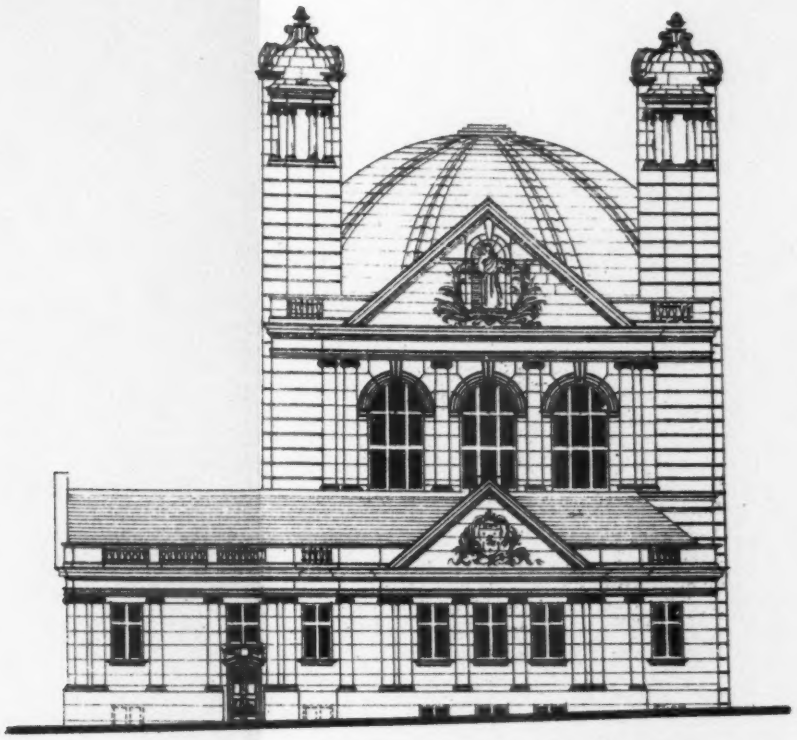


BASEMENT PLAN





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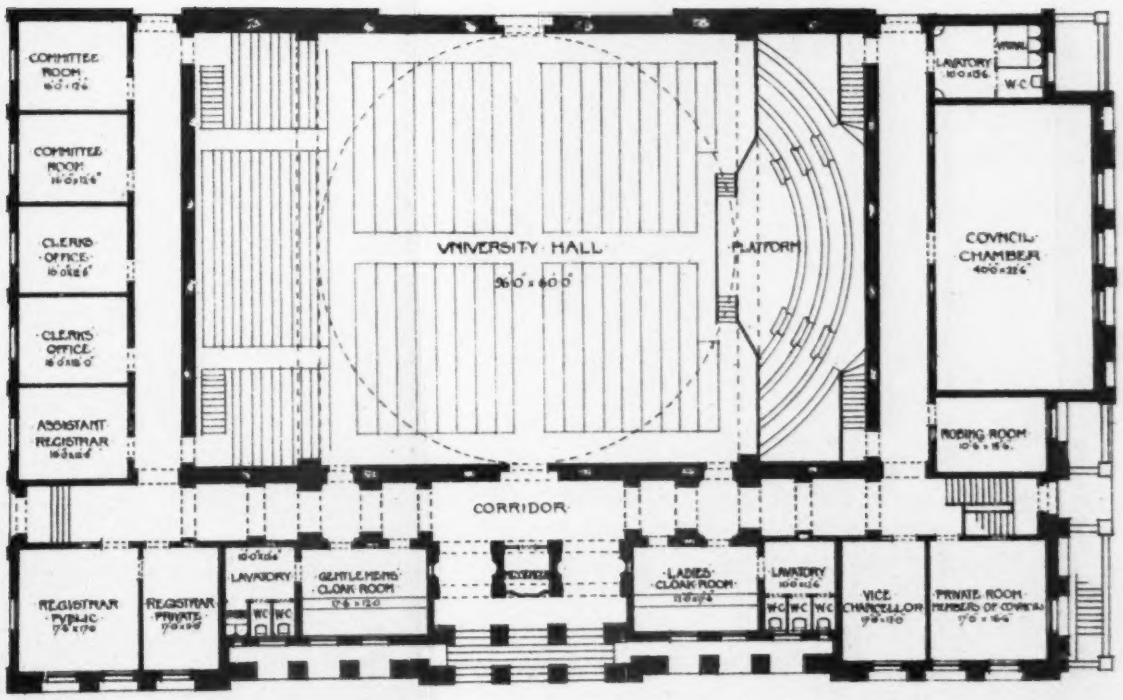

GROVND·PLAN

50 60 70 80 90 100 110 120 130 140 150 FEET

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ATED DESIGN.—By Mr. E. W. Wimperis, A.R.I.B.A., & Mr. H. S. East, A.R.I.B.A.

KENILWORTH HOTEL, GREAT RUSSELL STRE

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ELL STREET.—Mr. G. Waymouth, F.R.I.B.A., Architect.

KENILWORTH HOTEL, GREAT RUSSELL STRE

"INK-PHOTO" SPRAGUE & Co LTD 4 & 5 EAST HARDING STREET FETTER LANE E.C.

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DESIGN FOR KURSAAL, CHELTEN

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CHELTENHAM.—By Mr. G. H. Elphick

THE SEASONING AND PRESERVATION OF WOOD.

(*Continued from page 161.*)

The water taken up by dried coagulated albumen is very much less than that taken up by dried uncoagulated albumen. There is one rather deep subject in connexion with this chemical union of water and cellulose that I propose to go into. It is, of course, well known that paper, cotton, flannel, and such things, have an affinity for water, but it is not generally recognised that the combination of water with these things may be sufficiently energetic to raise considerably their temperature. Dr. R. E. Dudgeon seems to have been the first to point out that abnormally high temperature (106 deg. Fahr.) might be registered in the mouth by merely wrapping some cotton wool, or the corner of a silk handkerchief round the bulb of a themometer, and then forcing the expired air through the material. The normal temperature is 98·4 deg. Fahr., but you are able by this means to get a temperature of 106 deg. to 110 deg. Fahr. Dr. Dudgeon concluded that these high temperatures were attributable to the temperature of the breath, which he thought must be higher than that of the mouth; but, of course, this was quite wrong. Sir W. Roberts confirmed the observations but contested the conclusions of Dr. Dudgeon, and attributed the rise of temperature within the thermometer wrappings to the conversion of latent heat into sensible heat, by the rapid condensation of aqueous vapour. The phenomenon was rendered much more marked by previously drying the material used to surround the thermometor bulb. On the other hand, it became less and less marked when the experiment was repeated with the same strip of flannel, until, on the third attempt, the temperature recorded was only 98·6 deg. Fahr. "It is probable," says Sir W. Roberts, "that with the super-exsiccated flannel the first portions of the aqueous vapour, condensed at the beginning of the experiments, pass from the gaseous into the solid form and constitute that portion of water which is incorporated in intimate union with all organic tissues."

Dr. H. F. Parsons repeated the experiments with a clinical thermometer, and showed that the same action took place at a higher temperature by means of the following experiment:—A thermometer was wrapped in a few rolls of flannel and heated in dry air at 220 deg. Fahr. for some time; it was then allowed to cool a little, and as the mercury fell the index was shaken down till it stood at 212 deg. Fahr. The dry roll of flannel was then placed in a tin cylinder and exposed for five minutes to steam at 212 deg. Fahr., at the end of which time the thermometer was found to register 239 deg. Fahr. The explanation of this is that the energy which is released in the combination of water with cellulose is very considerable; it is in the nature of a chemical reaction.

Now, why have I gone into this question of the nature of the combination of wood and water? Because of one practical point. Fires have already occurred in wood dried with hot air when the wood was afterwards exposed to moist air, owing to the great energy of the combination between water and cellulose. Another reason—which is, in the process I am going to describe, I believe, one of the causes of success—is this: During the cooling process, energy or heat is developed that considerably raises the temperature of the wood. So then we have seen the difference between coagulated albumen when dried, and dried uncoagulated albumen. We have also dipped into this mysterious chemical affinity that water has for cellulose, and have, I hope, to some slight extent elucidated the mystery.

The only other scientific subject I have to touch on is the reason that wood decays. The active agents in the destruction of wood are micro-organisms and mould. The micro-organisms require three things for growth, viz., a sufficient degree of moisture, food, and often oxygen. All these conditions are well provided in wood, and unless we actually impregnate wood with chemicals such as creosote, so that micro-organisms cannot grow in it, we practically cannot guarantee that it shall not decay. But still a very great deal can be done. For instance, green unseasoned wood decays more readily, if placed under favourable conditions, than seasoned wood, because there is more water in it, and because the chief food of the mico-organism—the sap, the albuminous material—may be said to be present in a more digestible state.

So that a progress which kills all the micro-organisms in the wood, in which the albuminous material is coagulated, and in which there is less water, would theoretically be very efficacious. So I hope you will agree that I have led you to the conclusion that I have reasons for thinking that it is necessary to apply heat in some way to wood, to get the desired effect of seasoning. This cannot be done by air, at atmospheric pressure, for if the air is too hot the wood case hardens and warps. If you dry at a low temperature I believe that the albuminous material is dried in its uncoagulated state, and the wood is, therefore, not strengthened by the process, but if anything weakened. The only way in which hot air is successfully used is in Colonel Haskin's process—a very excellent one—in which the wood is subjected to a high temperature—about 320 deg. Fahr., if I remember rightly—and an enormously high pressure. Well, the effect of that is to cause a certain amount of change in the constituents of the wood, and to produce actually from the wood an antiseptic material which protects it and prevents it from so readily becoming the prey of micro-organisms. But unfortunately this process is extremely expensive, far more so than steam drying.

In applying heat to wood by steam, you can either use saturated steam at atmospheric pressure, or at a high pressure. In the first case the process takes very long, and you cannot get a good result; in the second (with high pressure) it is inconvenient and costly. In my experiments I was led to try superheated steam. Steam or water vapour may be said to be saturated when no lowering of its temperature or increase of its pressure is possible without condensation. The temperature, at which condensation occurs, varies according to the quantities of steam present in a given volume—in other words, it depends upon the pressure exerted by the steam. The closer together the molecules of the steam, the higher is its pressure, and the more readily does it condense. We may therefore say that the greater the pressure of steam the higher is its condensing point. Steam whose temperature is above the condensing point can be said to be superheated, that is to say, it is not readily condensible. Here I have a small apparatus for demonstrating the method by which superheated steam is produced. If I put a match into the superheated steam it is sufficiently hot to light it. Though superheated steam is so hot, yet, if it is in sufficient quantity, the hand can be placed in it with impunity, because it will take water from the hand to help it to reach a lower temperature at which it may condense.

Now it is always most convenient in thinking of any subject connected with heat, to look on it as being capable of being measured, as it were, by the bushel, so that you may be said to be carrying units of heat from one place to another, in passing hot water along a pipe. You can do the same thing with low and high-pressure steam, using it as a vehicle for conducting the heat from one place to another. In the case of superheated steam, you add more heat still.

One of the chief reasons for the value of superheated steam is because of one of its qualities that is also a positive defect under other circumstances—the property it has of giving up its superheat, quickly, in its effort to regain its condensing point; thus, it will evaporate water with remarkable rapidity; while at the same time it parts with its superheat so readily in transit through pipes that it is very uneconomical to employ it any distance away from its source. In the apparatus I have designed—for seasoning timber by superheated steam—no heat (except by radiation from the whole apparatus) is lost, and the steam is able to utilise all its heat in drying the wood. The material, the wood itself, and the adhesions between the fibres and the molecules generally, are such that they do not like any violent change. If you hurry the process, the timber, as I have said before, shows very considerable resentment; you find it cracking and warping in all directions.

[Mr. Higgins here exhibited a series of lantern slides showing the course of his experiments and the means by which they were carried out. He also showed slides of stoves in course of construction, and completed, at the works of Messrs. William King & Son, London, of Mr. Hy. Lovatt, at Wolverhampton, and at Tidworth, Andover. He also included a number of micro-sections of unseasoned and seasoned wood.] During his explanations he said: "The delicate fibres separating the air spaces are not in any way fractured. That is one of the best features of this seasoning process. It is a very good indication that the process does not cause any violent change in the wood."

The first experiment with superheated steam for seasoning wood on a large scale was carried out by Mr. Henry Lovatt, at Wolverhampton. The plant was erected regardless of cost. Mr. Lovatt built two large stoves, fed with live steam from a Babcock & Wilcox boiler. I think I am correct in saying that the horse-power of this boiler was nearly twice as great as was necessary; the firing was done by a man specially detailed for the purpose. There is really no reason why exhaust steam should not be used if it was available; it can be superheated just as readily as steam coming direct from a boiler. I am also convinced that it would be convenient and economical to take the steam as it leaves the first chamber and use it again in the second; it might even be superheated again between the two chambers.

Now the question naturally arises whether this method of treating the wood answers the purpose for which it is devised? The best answer to this is the attitude of the men in Mr. Lovatt's works. Mr. Wilson Lovatt recently told me that when the stoves were not at work for a week or so there were many anxious inquiries from the shops—indeed, he says he does not know how they ever got on without them.

Now what steps have been taken to show that the wood has not had its nature altered? The wood has been subjected to breaking and crushing tests at the Cambridge University Engineering Laboratory with most satisfactory results. With regard to the test of time, some seasoned wood has been made into joinery for two or three years, and I am informed that it has been perfectly satisfactory. Mr. Mackenzie, F.S.I., has also made careful tests of timber seasoned by my process, and reports most favourably about it. But the most important thing after all is the result of the practical work, for it is this only which really counts. This is roughly the record of what has been done in Mr. Lovatt's stoves at Wolverhampton during the last two and a half years:—

75,000	cubic ft.	of	deal	...	average time	18 hrs.
8,000	"	"	oak	...	" "	26 "
11,000	"	"	mahogany		" "	26 "
4,000	"	"	pitch-pine		" "	29 "

This amount has been seasoned with *live* steam at an average cost of 1¾d. per cubic foot.

I feel I must mention a matter of some delicacy. The wood seasoned by my process has been referred to as better than wood seasoned by the natural time-seasoning method. The way I look at this point is this: after all, wood is but dead tree, and time-seasoned wood is dead tree subjected to the influence of certain physical agents, such as water, air, heat, and cold, and if I have, as I venture to claim, contributed something to the comprehension of the principles underlying the seasoning of wood, and have shown that certain physical agents do attain the result which from my theoretical reasons I feel they ought to attain, I wish to say that wood seasoned by my process is dead tree subjected to superheated steam, with the albuminous matter of the sap coagulated, and the relations of the wood with its water altered. I see no reason, personally, to look on time-seasoning as vital or mysterious in any way. I dare say the Egyptians looked on embalming as the natural method of seasoning dead Egyptians. Naturally the great test is time, and there is certainly no *primâ-facie* reason why, if wood presents the qualities that the wood seasoned by my process does, it should not be as natural and as enduring as wood seasoned by the time method.

The Impregnation of Wood with Liquids.

If you take a piece of wood—such as a sleeper—and put it in a tank inside a hot chamber and treat it with superheated steam, it will in the course of twenty-eight to thirty hours be thoroughly dried, and the whole of the air be removed by diffusion. If you can imagine this sleeper absolutely full of superheated steam, with no air, and with very much less water than when it was put into the chamber, then if you were to fill the tank with creosote and cover it up, in the course of an hour or two the quantity of creosote which had penetrated into the sleeper would surprise you.

A process very much used in the United States is to add alkali, carbonate of soda, and water—so as to dilute the creosote. The process which I have described is the only one, I believe, at present devised that will absolutely impregnate wood right through. The reason for that is a very simple one, viz.: that all the air is taken out. If you take all the air out by diffusion, at the same time seasoning the wood, you get this very interesting result. Anything except colloids (substances which do not crystallise) will enter into the wood under these conditions. Creosote can be introduced to the extent of over 30 lbs. per cubic foot. So therefore this process has been carefully tested, and experiments have been made for some four or five years, and up to the present nothing but encouraging results have occurred.

Although I myself devised the process, I must admit that success is due to the enterprise and courage of Mr. Henry Lovatt, and to the energy and perseverance displayed by Mr. Wilson Lovatt in carrying out the real experiments. It needed a very great deal of courage to fill stoves as large as Mr. Lovatt's with oak or mahogany, or even deal, when all my experiments were made only with the small copper cylinder, a photograph of which I have shown you. The real test is work on a large scale. I would very much like to see extensive experiments made with millions of cubic feet instead of thousands, and, as far as I can see, there is no one I would rather ask to help me in that work than the audience I have had the honour of addressing."

The Chairman said that in considering this process the great trouble he found was that it seemed difficult to grasp the fact that he was dealing with superheated steam, which was a very different thing from damp steam; and he did not think Mr. Higgins could have brought that fact home to their minds more clearly and quickly than by his simple experiment of lighting a match at a jet of superheated steam. Certainly the last place at which we should usually try to light a match would be at a steam exhaust. "In trying this process, of course, I followed entirely on the experiments which Mr. Lovatt had made, and of which he kindly gave me the advantage. My stove, of which you have just seen a photograph, was formed on Mr. Lovatt's model, but was built as a single instead of a double stove; otherwise it was constructed in the way which has been already explained, and I will not detain you now by describing it in detail. The stove is practically an oven, with flues all round to assist in keeping it warm. There is a fire underneath which superheats the steam and at the same time heats the oven. A 4 h.-p. boiler supplies the steam, which passes over the fire, and then into pipes of varying lengths inside the oven. The superheated steam is thus evenly distributed, and the whole of the wood is impregnated with it. The total cost of the oven, as we constructed it, was about 180*l*. In building in an old place you have certain things to alter, and so on; but I think that would be a fair average cost. We found some little difficulty in clearing the steam out of the oven immediately after the process was completed, but that was finally got over by making increased draught holes in the roof and additional vent holes in the doors. We had been warned of the fact Mr. Higgins mentioned to you, that it is not well to introduce the cold air too quickly after you have reached the extreme heat—there may be a fear of spontaneous combustion. I followed, therefore, in order to be safe, the theory that the full draught of air should not be put in until the stove had cooled down to below 200 deg., but perhaps Mr. Higgins would tell us afterwards what he considers a fair temperature—a safe temperature—to arrive at in the cooling of the stove before any great amount of ventilation is allowed. There is another objection to introducing extreme air too quickly, that the wood is likely to split from being cooled too rapidly. Of course, it is necessary when the stove has cooled down sufficiently to get as much ventilation in as you possibly can, or else the remains of the steam may be left behind, and your wood may be slightly saturated. That was a difficulty we certainly found at first, but by inreasing the draught we found that the wood came out perfectly dry. One idea that I understood Mr. Lovatt had been working on was to use damp steam for the first few hours—I think generally about four hours, until a temperature of about 160 deg. or 170 deg. was arrived at. Now, although the temperature rose steadily about 10 deg. an hour from turning in the damp steam, I could not help thinking from the results that damp steam was detrimental. I, therefore, so far varied the process by discarding the use of damp steam. The steam from the boiler is now got up first, and is turned into the stove at the same time that the superheating fire is lighted, so that we get no damp steam into the stove at all; we start entirely with the dry steam. The result, in my opinion, is very much better, and we can take two or three hours off the times given by Mr. Lovatt for the process, with satisfactory results. I imagine that I am in this only carrying out the original idea of Mr. Higgins, which I understand was to use superheated steam only. The effect of the process seems to be that (if you have the wood cut down and then try to work it) directly it comes out of the stove, the wood is very slightly harder and seems to have lost its "nature" to a certain extent, but after a couple of days it not only regains its nature, but works in a more silky and easy manner. The wood seems to be firmer and more easily worked, and, far from having suffered from the treatment, I think, on the whole, that it is improved. With regard to the wood standing, of course it is difficult to tell for a good many months, and sometimes even for a year or so, how wood is going to stand. We all know, as builders, that it has an unpleasant habit sometimes of showing cracks in framings after many months, and it causes us very great annoyance at times in that way. There is a specimen here to-night of a little piece of framing that has been put together for some three months, and has stood over hot-water pipes with a continual heat of between 80 deg. and 90 deg. Fahr. the whole of that time. I think that it is a reasonable success. You will notice that the specimen has gone slightly, which would rather show the *bona fides* of it. I ought to explain that this little framing is made of deal which was newly imported and quite green when put into the oven; it was cut down directly the process was completed, taken at once to the joiners' shop, and framed as you see it. As regards the creosoting process, I am not very well acquainted with that. . . . ."

Mr. George T. Hine referred to the fact that Mr. Lovatt had secured the contract for an important building, of which he was the architect, and when approaching completion had informed him that he had used in the woodwork of part of the building a quantity of wood that was seasoned by this process. Mr. Lovatt said he had taken the responsibity for this on his own shoulders, believing that the result would be satisfactory and would comply with the specification. He (Mr. Hine) went down to examine the building and discovered very little difference in the woodwork. He looked for some defective woodwork and found a little—not very much—but he found afterwards that it was not in the artificially seasoned wood. He went down again at least two years after the work was completed, and found that this woodwork in particular was standing as well as, or better than, the other woodwork in the building. If by this process they could obtain good seasoned wood, he thought that Mr. Higgins would be a boon to the architectural and building professions, and to the community at large.

Mr. W. F. Wallis asked if it was necessary that the furnace should be kept alight during the whole time of seasoning—whether a man had to be in constant attendance to keep the steam super-heated. He also wished to know if the process made the wood more absorptive. He had sometimes found that he got into just as much trouble by using wood too highly seasoned as wood not sufficiently seasoned. If it happened to go into a damp, exposed place it seemed to absorb moisture and would consequently swell. If he used unseasoned wood he very often got into trouble through the framing shrinking. On the other hand, if the wood were too highly seasoned—and he thought it would be more likely to suffer from that than from the other defect—it would absorb moisture and would swell, forcing the shoulders of the framing over.

Mr. Wilson Lovatt replied that it was necessary for a man to be in attendance during the whole of the time the wood was under steam, but he need not be, in any sense, an expert. A night watchman would be sufficiently capable. It was essential that the superheated steam should be going in the whole time. With regard to Mr. Wallis's question as to absorption, so far as his experience went there had not been this difficulty.

Mr. C. S. Percival inquired the size of the stoves erected.

Mr. Lovatt: The Wolverhampton stoves are 20 ft. by 8 ft. by 8 ft., but those just erected and started at Tidworth, at our Salisbury Plain contract, and of which you have seen photographs, are 30 ft. by 9 ft. 6 in. by 9 ft. 6 in.

The Chairman: My stove is 20 ft. by 8 ft. by 8 ft. (To Mr. Lovatt: We should like to hear a little of your experience.)

Mr. Lovatt said he thought that he could say positively that during the last few years they could never have got their work through their joiners' shops without this artificial means of drying, so great had the demand for timber been. Their stoves were kept going practically day and night, week in and week out, and with, he considered, very satisfactory results. He had not had any complaints of the wood shrinking. He was sure that it would pay all builders, if their contract were large enough, to have one of these stoves erected on the site, if only for drying flooring. The stove need not be of brick. For temporary work it could be constructed in other ways, and would be just as efficient as a brick stove. As regards the cost of treating the timber, that included filling, drawing, conveying to the joiners' shops, also the fuel, and men's wages in attendance on the stove. There had also been a considerable saving in interest on capital locked up in timber, as they could now use the timber immediately after importation.

A Member: Eighteen hours, I take it, is the minimum time?

Mr. Lovatt: It entirely depends on the thickness of the wood, but flooring could be done in sixteen hours, or even less.

Mr. Hine (to Mr. Lovatt): Do you make steam for the purpose or use exhaust steam?

Mr. Lovatt: At Wolverhampton we make the steam specially, but at Tidworth we use exhaust steam.

Mr. Arthur Faulks: I would like to know whether it is necessary to use a forced draught in the cooling process, whether any firm is making the superheaters, and whether it would be possible to put a superheater in an iron pipe for a portable stove?

Replying to the latter question,

Mr. Lovatt said that it would be quite practicable.

Mr. Higgins said that it would not do to have the fire too close to the superheater pipes; they would waste very much more quickly. Forced draught was not necessary in the cooling process. One point was raised by the Chairman which was really a very interesting one—with regard to the possibility of the moisture combining with the wood too energetically if the stove were opened before the temperature was sufficiently low. The temperature should be under 200 deg. Fahr.—it had better be nearer 150 deg. Fahr. It really varies according to the length of time the steam had been on; and it applied just as much to air-dried wood as to steam-dried wood. It was merely this chemical property, water combining with cellulose and causing this liberation of energy, and increased heat. He thought that it was a very great advantage in this process that, during the cooling, when the steam was shut off, they probably got a rise in temperature in the wood to help to coagulate this material and assist the seasoning process. But of course it was absolutely necessary not to open the stove till the temperature was below 200 deg. Fahr., because, if they did that, it might be possible to get spontaneous combustion.

A vote of thanks to Mr. Higgins brought the proceedings to a close.

Correspondence.

"TACKY" PAINT.

Sir,—It would be useful and interesting to read the opinion of some of your practical decorative subscribers on the above matter. I buy the best lead, oil, turps, driers, and colours on the market, or, to be strictly accurate, should say that I pay for the best genuine quality of each. The colours are mixed and applied by different workmen, and at first dry and harden off as may be reasonably expected. Yet on standing a few weeks a kind of softness sets in, so that a person pressing his hands on the work or leaning against it would discern a distinct "tackiness." What are the probable reasons for this unsatisfactory condition? TARBRUSH.

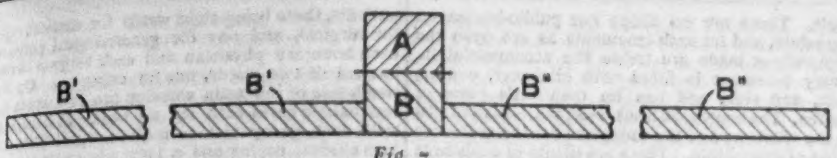

Fig. 7.

The Student's Column.

CONCRETE-STEEL.—VI.

GENERAL THEORY.

From consideration of the tables already given it is evident that the strength of concrete in compression is about ten times its strength in tension. In the case of a beam supported at each end, the unit stress due to bending moment is equal above and below the neutral axis, and the lower fibres would fail in tension long before the upper fibres could fail in compression. A similar though less noticeable inequality of compressive and tensile strength characterises cast iron, and the familiar section of a cast-iron beam illustrates the method adopted for making good the deficiency of resistance of the lower flange. Treatment of the same kind would be out of the question in the case of concrete, for if the difference of resistance were completely adjusted, the dimensions of the beam would assume absolutely impracticable proportions. This view is illustrated by Fig 7, where the beam is 8 in. wide by 12 in. deep. Assuming the neutral axis to be equi-distant from the upper and lower surfaces, the compression area A would be 48 sq. in., and to provide a tension area of equal value, say 480 sq. in., it would be necessary to increase the width of the lower portion, B, by adding two 3-in. flanges, B', B', each 72 in. wide. Therefore it is manifest that concrete alone does not lend itself to the economical construction of members intended to resist tensile stress. By the incorporation of steel in the tension area the lacking element of strength can easily be supplied, without altering the original dimensions of a concrete beam. The compressive strength of the concrete can then be fully utilised, and corresponding tensile strength is supplied by the steel. If the steel were intended to act quite independently of the concrete the principle involved would be as diagramatically represented in fig. 8, where

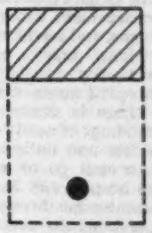

Fig. 8.

the upper area of concrete is supposed to be entirely in compression, and the steel bar in the lower area to be entirely in tension, these two elements being connected by an imaginary web. Assuming such an arrangement to be practicable, it would only be necessary to provide a steel bar of any convenient section, and of sufficient area to withstand the calculated street, and to connect the concrete and the steel by a suitable web. Taking the allowable unit stress of concrete at 500 lbs. per square inch, and of steel at 15,000 lbs. per square inch, the relative areas of concrete and steel would be 30 sq. in. and 1 sq. in. respectively. The most suitable and convenient means of connexion is to complete the beam, as indicated by broken lines in fig. 8, thus incidentally affording protection to the metal against corrosion and fire. If the metal were free to slide within the enveloping concrete, the compression and tension elements of the beam, as represented by concrete and steel, would still act independently, and the steel would also act independently of the concrete in the tension area. The concrete in the lower area would add little strength and would constitute an additional load to be supported. In practice, however, the concrete would adhere firmly to the steel, and it follows that every variation in the volume or length of one material, whether caused by temperature or by stress following the application of a load would be accompanied either by corresponding variation of the volume or length of the other material, or by internal stress due to the resistance of one material to the movement of the other.

Here, then, we have further points for consideration: (1) the adherence of the concrete to the steel; (2) the relation between the coefficients of expansion of the two materials; and (3) the relation between the values of the coefficients of elasticity of the concrete and the steel. These matters are the more important, as the object is to effect a combination so that the two elements of concrete-steel may act in unison and behave like a single homogeneous substance.

Various experiments have been carried out with the object of determining the adhesion of concrete to steel. Dr. Ritter* states the value to be from 568 lbs. to 668 lbs. per sq. in. In the recent investigations of M. Considère it was found to vary from 71 lbs., 157 lbs, and 171 lbs. per sq. in., according to the amount of water used in mixing the concrete; and in the case of steel upon which the mill scale has been left, it was 256 lbs. per sq. in. The general practice of engineers on the Continent and in the United States† is to adopt 570 lbs. per sq. in. as the basis of calculation, but this is probably too high a value for plain rods or bars.

The statement is sometimes made that the bond of concrete and steel is not destroyed by thermal or other stresses. There is, however, satisfactory evidence that adhesion may be overcome by interior stresses following unequal expansion of the two materials when under the influence of heat.

The adhesion originally existing between the constituent parts of concrete-steel is also affected by working stresses, as well as by vibrations and shocks such as are experienced in most structures. For this reason it is well that embedded rods should be of such section as will furnish a reliable form of mechanical bond in addition to that given by adhesion of the concrete. With this object, some designers make use of corrugated and twisted bars, and others use network of various kinds. A corrugated bar made in St. Louis, U.S.A., consists of a square with a system of corrugations extending around it. This bar is of considerable merit, giving great mechanical adhesion with a proportionately small quantity of metal. The Thacher bar, patented in the United States, is of circular section flattened at intervals, and it is claimed by the inventor that it never slips; also that the circular form does not cause incipient fracture, as may happen when square bars are employed. The Ransome twisted bar, another American device, has been used with considerable success. Some experiments made to determine the strength of the bond so formed are thus described‡:—

"Half-inch bars were embedded in blocks of concrete 6 in. square, and which varied in length from 12 in. to 28 in. The bars projected about 2 ft. from one end of the blocks. One face of the concrete bore against a plate, the bar passing through a hole in its centre. A direct pull was applied to the bar, and in each case, when the length exceeded 21 in., the bar broke outside the concrete without pulling therefrom. In these cases the ultimate stress on the steel averaged 81,835 lbs. per square inch."

From the data now presented it is possible to determine the exact length to which bars of all sizes should be embedded to secure a satisfactory bond.

The force (P) required to break a round steel bar without breaking the bond can be calculated by the equation: $P = F_t \frac{\pi d^2}{4}$; where F_t = ultimate tensile strength of the steel in lbs. per square inch, and $\frac{\pi d^2}{4}$ = area of the bar in square inches.

* Schweizecische Bauzeitung, 1899, pp. 41, 49, 59.
† Proc. Eng. Soc., Western Pa., vol. XIX., p. 147.
‡ Proc. Am. Soc, C.E., Vol. XXVI., p. 712.

The force (P_1) to break the bond without breaking the bar is shown by the equation: $P_1 = l \pi d \times f_a$; where l = length in inches of the embedded bar, $l \pi d$ being consequently the surface of steel in square inches in contact with the concrete, and f_a = adhesion in pounds per square inch.

By equating the foregoing expressions we obtain a simple rule for finding the length of steel that must be embedded in order to make the strength of the bond greater than that of the bar.

Thus: $l = \frac{F_t}{4 f_a} d$.

Calculated by this rule, we have the figures in Table XX. representing, in terms of the diameter, the minimum length for which a round steel bar should be embedded in concrete to ensure a satisfactory bond, the bases of computation being the data previously mentioned.

Table XX.—The Adhesion of Concrete and Round Steel Bars.

(Ft=Tensile stress per square inch on steel.)

Adhesion per Square Inch (f_a).	Type of Bar.	Length in Diameters to Ensure Bond.		
		Ft= 80,000 lbs	Ft= 40,000 lbs	Ft= 20,000 lbs
71	Plain round	281	140·5	70·25
157	" "	127	63·5	31·75
171	" "	116	58·0	29·00
256	" "	78	39·0	19·50
487	Twisted square...	41	20·5	10·25
570	Plain round	35	17·5	8·75
668	" "	29	14·5	7·25

As the unit stress on steel would not exceed 15,000 lbs. to 20,000 lbs. in practice, it will be seen by the table that the embedded length necessary for security is always within moderate limits, and even if the lowest value for f_a be taken, the length for a ½-in. diameter bar is less than 3 ft., or for a 1-in. diameter bar less than 6 ft. In the case of twisted bars, with a unit stress of 20,000 lbs., the lengths for ½-in. and 1-in. diameters are 5-in. and 10-in. respectively. In ordinary practice it is probably quite safe to take the value of f_a at between 250 lbs. and 500 lbs., according to circumstances, but the embedded steel should never be painted, as paint prevents proper adhesion of concrete to the metal.

The assumption is frequently made that the coefficients of expansion for concrete and steel are of equal value. This supposition is not quite correct, for on comparing the figures already given we find the coefficients to be 0·0000066 for mild steel, and 0·0000055 for concrete, the difference being about 0·0000011. Hence the change of length for a given variation of temperature is about 18 per cent. less for concrete than for steel. Assuming the bond to be perfect, it is clear that temperature stresses must be caused in both materials. Increase of temperature above that prevailing during construction will cause tensile stress in the concrete, and, conversely, decrease of temperature will produce compressive stress.

Taking the coefficients of elasticity to be 2,800,000 lbs. for concrete and 28,000,000 lbs. for steel, and assuming the sectional area of the steel to be 2 per cent. of the concrete section, the resulting stress per deg. Fahr. would be about ½ lb. per square inch. Under ordinary circumstances it is not likely that temperature will be increased much above that prevailing during construction, and there is no reason for anticipating abnormal tensile temperature stresses. In the case of a fire it is not quite certain what might happen, for there are practically no records showing the precise influence of concrete in retarding or minimising the expansion of metal embedded therein. If both concrete and metal acquired a temperature of 2,000 deg. Fahr., the resulting tensile stress would probably reach an intensity of about 1,000 lbs. per square inch, but expansion might be equalised to some extent owing to protection of the metal on one hand and to exposure of the concrete to the direct action of flame on the other. As reinforced concrete is capable of sustaining without rupture a proportionate distortion of from ten to twenty times that sufficient to cause the failure of ordinary concrete, it does not follow that the inequality of expansion would necessarily be sufficient to cause cracks. This conclusion seems to be borne out by various fire tests of concrete-steel

constructions in this country and abroad in which, although the effects of deflection and cold water are generally added, the damage caused rarely extends beyond the development of fine cracks. During severe frost, it is not likely that the temperature of concrete-steel work will fall more than 50 deg. Fahr. below the temperature of construction. The effect then produced would be compressive stress, tending to counteract tension on the lower side, and its amount would be quite inconsiderable. Of course, the precise effect of unequal expansion will depend in every case upon the value of the co-efficients of elasticity of the materials, and also upon the percentage and distribution of the steel in the concrete.

Finally, it should be remembered that changes of temperature will always be gradual owing to the heat resisting properties of the concrete; and that internal stresses are to some extent relieved by infinitesimal slipping of the metal in the enveloping material. Hence, we may say that the secondary thermal stresses due to difference between the co-efficients of expansion are never likely to be of great importance in ordinary practice.

GENERAL BUILDING NEWS.

CHURCH, BRIDLINGTON.—A new church at Bridlington was dedicated by the Archbishop of York on the 29th ult. The building will be known as Emmanuel Church, and has been erected on a site adjoining Cardigan-road, on the Hilderthorpe (or south) side of the town. The building consists of nave and aisle. It has already cost 2,700*l.*, and when completed, with chancel, vestries, and south aisle, the total cost will be about 6,000*l.* The church has been built by Messrs. Brodrick, Lowther, & Walker, architects, Hull. The completed building will provide seating accommodation for 794 persons.

BOARD SCHOOL, DUNSTON, NORTHUMBERLAND.—A new elementary school has been erected at Dunston by the Whickham School Board, at a cost of about 6,000*l.*, near the north end of Ravensworth-road. The chief feature in the new school is the central hall—a top-lighted assembly-room, 70 ft. long, rising through two stories, with a gallery round the upper floor. Opening directly on to this hall are the whole of the classrooms; thirteen in number, as well as the teachers' rooms, cloakrooms, entrance-halls, &c. Altogether accommodation is provided for 840 children of both sexes. The staircases are in duplicate for the two sexes, and for safety in case of fire or panic, and are placed at opposite ends of the hall. They are constructed of oak steps supported by steel strings and joists. The general contractors for the works have been Messrs. J. Parkinson & Sons, of Blackpool, with the following sub-contractors: Messrs. Emley & Sons for the heating; Messrs. J. Tweddle & Co. for plumbing and ironwork; Mr. J. Hall, of Blackpool, for painting and glazing; the Acme Wood Flooring Company, of London, for solid block floors; Messrs. Hope & Sons, of Birmingham, for steel work; and the North of England School Furnishing Company for the furniture. Messrs. Farrer and W. H. Pace acted as clerks of works, and the design and superintendence of the buildings was carried out by the Architect to the Board, Mr. J. Wm. Roundthwaite, of Newcastle-upon-Tyne.

PUBLIC SCHOOL, WOODSIDE, ABERDEEN.—The work of building the new school being erected at Woodside for Aberdeen School Board is proceeding rapidly. The total cost of the school will be about 18,000*l.*, inclusive of the heating and ventilating arrangements, but exclusive of the furnishings and desks. The school will provide accommodation for over 1,537 children. The southwing, now all but ready for occupation, has seven classrooms on the ground floor, which will accommodate 461 children, and eight classrooms on the first floor, containing 480 places. The plan of both the ground and first floors provides a central corridor, with, in addition to the classroom, accommodation for the teachers. The floors of the ground floor, hall, and corridors, are laid with wood blocks on concrete, and the dados of the corridors, staircases, &c., are lined with tiles, and the furnishings generally are of yellow pine. A janitor's lodge has been erected at the south end of the school buildings, and is already occupied. The architect is Mr. J. A. O. Allan, the architect and master of works to the board. The contractors are:—Mason work, Mr. George Hall; carpenter work, Messrs. Hendry & Keith; slater work, Messrs. Merson & Stewart; plaster work, Messrs. J. Scott & Son; plumber work, Messrs. Thom & Strachan; painter and glazier work, Messrs. Murray & Mitchell; steel work, Messrs. Wm. Mackinnon & Co.; and iron and blacksmith work, Messrs. J. Abernethy & Co.

HOUSING THE WORKING CLASSES, BATTERSEA.—On the Latchmere Estate, Battersea, three, four, and five room tenements—with a few small houses—have been erected by the Housing and Works' Committees of the Borough Council. There are altogether—or, rather, will be by the end of the year, when all is complete—173 houses, with accommodation for 315 families, or about 2,000 souls. There are no shops nor public-houses on the estate, and for such tenements as are open the applications made are treble the accommodation. Every tenement is fitted with kitchener, copper, bath, and sink, and has its own little piece of garden. The houses are brick-built, the heads and sills to the windows and the canopies over the entrances being of granolithic. There are plenty of cupboards and shelves, all the floors are fireproof, and every house is fitted with the electric light—to be supplied by the borough—under "the penny in the slot" system. The whole of the cost, amounting to 105,000*l.*, lent by the County Council, will be met out of the rents, which have been fixed at 11s. 6d. a week for a five-roomed house, 10s. 6d. and 10s. for four-room houses and tenements, and 7s. 6d. for three-room tenements. These rents will cover maintenance, interest, and sinking fund.

INSTITUTE, WALSALL.—The foundation stone has just been laid of a building which is to serve as an institute for the Walsall Brotherhood. The site of the new building is on the Church Hill, and the institute, which is from the designs of Messrs. Bailey and McConnell, is estimated to cost about 1,600*l.*

NORWICH UNION LIFE OFFICE.—On the 27th ult. the stone which is to form the apex of the new building of the Norwich Union Life Office in Surrey-street, Norwich, was laid. The new offices have been erected from plans prepared by Messrs. G. J. and F. W. Skipper, architects, Norwich. Mr. G. E. Hawes was the builder, and Mr. E. Bilby the clerk of works.

TOWN HALL, SCARBOROUGH.—On the 28th ult. Princess Henry of Battenberg opened Scarborough new Town Hall and unveiled a statue to the late Queen. The new Town Hall was formerly the residence of Mr. J. W. Woodall, banker, and was known as St. Nicholas House. It is a mansion in the Elizabethan style, and was purchased by the Corporation, together with the grounds and other property, in 1898 for 33,500*l.* A further sum of 19,500*l.* has been spent in the conversion of the building to its present purpose. The work was carried out from the plans and under the superintendence of Mr. H. W. Smith, Borough Surveyor. The statue is a replica of that of the late Queen on Blackfriars Bridge, executed by Mr. C. Bell Birch, A.R.A.

ST. LAWRENCE, OLD BRADWELL, BUCKS.—The external walling throughout has been cleared of loose plaster and whitewash, and carefully repaired and repointed. The church has been drained all round. A lightning conductor has been provided. The copings to gables, much decayed and injudiciously repaired, have been renewed with Hornton stone in the tower, as formerly, and with Weldon stone elsewhere. New crosses, five in number, have been added to the gables, as well as new springers and apex stones, and a buttress has been added to make secure the west end of the south aisle, and two new windows, which were absolutely necessary for lighting purposes, have been inserted. The tower and chancel have been retiled, and the former provided with lead gargoyles, and new oak luffers added to belfry stage. The work has been carried out at the sole cost of Mr. C. C. Baily, a nephew of the vicar, in memory of his brother, the late Mr. W. O. Baily. The works have been done by Messrs. Kemp & Sons, of Stantonbury, from the designs and under the personal direction of Mr. E. Swinfen Harris as architect.

VICTORIA HOSPITAL, BELFAST.—The Royal Victoria Hospital, Belfast, was recently opened by the King and Queen, as we announced last week. The building owes its special form to the consideration on the part of the architect (Mr. W. Henman) of the objections to pavilion buildings of several stories, viz., the distances apart of the wards, necessity for staircases and lifts, the excessive labour to the staff, and the difficulties of supervision and administration; he therefore suggested it might be better to spread out the wards on one story only, placed side by side, without intervening open spaces, lighted from the ends and by continuous lantern or clearstory windows. Sketch plans having been approved, working drawings were prepared in conjunction with his partner, Mr. Thomas Cooper, and in the autumn of 1900, a contract was entered into with Messrs. M'Laughlin & Harvey, of Belfast, who have carried out the buildings. Mr. G. A. Flower acted as clerk of works; Messrs. W. A. Stephens & Son, of Donegall-square North, being the quantity surveyors. The accommodation in the new buildings is for 300 patients, eight resident medical and surgical officers, a superintendent, a matron, seventy-six nurses, and thirty-two male and female servants. The administrative buildings, of four stories and basement in three separate buildings, provide a spacious domed entrance hall (above the porch to which is a bronze statue of the late Queen Victoria, executed by Mr. J. Wenlock Rollins, sculptor), a board room and general office in the central block, and accommodation for the resident staff; the nurses' home, the attendants' and servants' quarters, the dispensary, kitchen department, and storerooms in the east and west wings. These buildings open, on the ground floor, into a main corridor, running east and west, 440 ft. in length by 9 ft. in width, to the south of which open branch corridors leading to seventeen wards and their accessory rooms. The principal wards (each for fourteen beds) are alternately arranged for male and female patients, there being eight wards for medical, eight for surgical, and one for gynæcological patients, each honorary physician and each surgeon having control of two wards, one for either sex. On the north side of the main corridor are two wards for ophthalmic cases each for six beds. In connexion with each group of four medical wards there are two clinical rooms and a large classroom for students, and to every pair of surgical wards there is an operating-room, in addition to special operating-rooms for the gynæcological and for the ophthalmic departments, each completely fitted with sterilising, electrical, lavatory, and other necessary appliances, as well as surgical instruments. Near by each of the nineteen large wards is a separation ward for two beds. A ward kitchen serves each pair of wards (except for the gynæcological cases, where the department is self-contained). Bath rooms and conveniences are attached to all the principal wards, as well as linen cupboards, and there are storerooms for patients' own clothing. Two detached buildings are provided towards the west end of the site for isolation purposes, one being for six and the other for four beds, with kitchens, conveniences, and nurses' bedrooms. To the west of the administrative buildings is the out-patients' or "extern" department, consisting of a large waiting-hall, with medical and surgical consulting-rooms, two operating-rooms, registrar's office, &c., grouped around, all on the ground floor, and connected with the main corridor of the hospital, retiring-rooms for students being provided in the basement. Further to the west is a detached building containing the pathological department, which comprises a laboratory and microscopical examination room, a post-mortem room, mortuary, exhibit and viewing rooms. At the east end of the site are two detached buildings: one is the boiler-house, containing two powerful steam boilers, disinfecting apparatus, and an incinerator (the chimney from the furnaces, holding a prominent position, is treated architecturally); the other building is the laundry, fitted with very complete steam appliances. Soiled linen is taken from the wards to the end of the main corridor, sent down a glazed earthenware tube, and conveyed to the receiving-room in the laundry, when, after making the circuit of the washhouse, drying closets, and finishing department, it is transferred to the linen store in the basement of the administrative buildings, ready for re-use. Another building attached, at the basement level, to the east end of the main corridor, contains the appliances by which fresh air is supplied throughout on the "Plenum" principle. Everything is in duplicate, to allow of the necessary rest, cleaning, and repair of the several parts. There are two separate air intakes, each about 30 ft. square, with numerous openings on three sides for admitting air, which is drawn in, cleansed by passing through moistened screens, warmed in cold weather, and forced on by two powerful "fans" or air propellers, each 10 ft. in diameter (manufactured by Messrs. Davidson, of Belfast) into the main air duct, 9 ft. wide, starting at 20 ft. in height, gradually diminishing to 5 ft. 6 in., as branch ducts convey the air to the several wards, rooms, and corridors above. Either or both of the "fans" may be employed at will, provision being made for changing the whole atmosphere of the hospital seven times per hour in winter and ten times in summer, with a cubical capacity in the buildings of nearly one million cubic feet. Suitable inlets and outlets being provided, this change of air will go on continuously, and every part of the hospital will be maintained perfectly fresh and wholesome throughout the night as well as by day, without the necessity for opening any windows. It is this fact which has made it possible to place the whole of the accommodation for the patients compactly on one floor level. The cost of the buildings, including the whole of the mechanical appliances, will not exceed 300*l.* per bed.

OPERA HOUSE, NORWICH.—The new Grand Opera House, Norwich, has just been opened in St. Giles's-street. The house is built on the two-tier system. The stalls and pit are on the ground floor, the dress circle and family circle are on the first tier, and the gallery is on the second tier. The auditorium has a width of 54 ft., with a depth of over 60 ft. The stage is 75 ft. wide, and has a depth of 40 ft. The holding capacity of the theatre is as follows:—Four private boxes for four each, sixteen; stalls, 200; pit, 800; dress circle, 120; family circle, 200; gallery, 500. On a level with the family circle is a grand saloon and smoking lounge of about the same size as the crushroom, and directly over it. The pit saloon below is the same size, and there is a bar for the stall patrons on the prompt side of the stalls. Three pairs of doors lead out of the grand saloon on to what will be treated as a roof garden, over the circular arcading of the front. The theatre is lighted throughout with electricity, including the stage. All parts are heated with low-pressure hot-water apparatus. The decorations are in the French Renaissance style. Space has been allowed in the orchestra for a band of twenty-five performers. The architect is Mr. W. G. R. Sprague, of London. The contractors have been Messrs. G. Longden & Sons; decorators, Messrs. De Jong & Co., London; upholsterers, Messrs. Dean, Birmingham; electricians, Messrs. Mann, Norwich; constructors of the stalls and iron work, Messrs. Smith Walker, London; construc-

tors of stage and other appliances, Messrs J. N. Lyons, London. The clerk of works was Mr. T. U. Hill.

THE YORKSHIRE INEBRIATES' HOME, CATTAL.—The foundation-stone of the new reformatory established for the county of York, under the Inebriates Act, was laid on the 30th ult. The building, the construction of which, from plans by Mr. Vickers Edwards, has just been commenced, is at Cattal, midway between Harrogate and York.

FIRE STATIONS, LONDON.—Mr. E. Smith, the Chairman of the Fire Brigade Committee of the London County Council, recently laid the memorial-stones of the fire stations now being erected in Old Kent-road and Evelyn-street, Deptford, to replace old buildings which have been demolished. The Old Kent-road station consisted of an engine-house, erected in 1869 at a cost of about 1,420*l.*, and of three cottages in the rear abutting on St. Thomas's-road. The Council some time ago acquired the neighbouring building, No. 306, Old Kent-road, and it was determined to pull down the old premises and to build on the site thereof a new station by the Works Department of the Council, the Architect's estimate being 10,650*l.* Work was commenced in May, and it is hoped that the building, which has been designed and is being erected under the supervision of Mr. W. E. Riley, the Council's Architect, will be ready for occupation by the end of April. The old station in Evelyn-street consisted of two houses, which the Council held on lease, and was erected in 1869 at a cost of about 1,600*l.* Two houses adjoining the station were purchased and the freehold of the station itself was acquired, the total expenditure under this head amounting to about 1,700*l.*, and the Council came to the conclusion to demolish the old premises and erect an entirely new station. The new building is being erected by the Works Department, the Architect's estimate being 10,350*l.* It is hoped that this also will be ready for occupation by the end of April. Both stations are to be what are known as "full stations."

NEW COUNTY HALL, NORTHALLERTON.—The foundation-stone of the new County Hall has just been laid at Northallerton. The building is to be erected on a site opposite the railway station, from the designs of Mr. W. H. Brierley, the County Architect. The contract is for 25,000*l.*, but with furnishing, &c., the expenditure will probably be about 35,000*l.*

BRISTOL STOCK EXCHANGE.—New Stock Exchange buildings, in the Renaissance style, were opened in Bristol on the 29th ult. The Exchange has a long frontage to Nicholas-street, the central portion of the front elevation for some length projecting beyond the line of the main building. Four granite bases and columns, having carved Corinthian capitals, support a moulded and carved modillion cornice with moulded pediment and cornices over, the tympanum of the pediment having the City Arms carved in the centre. The frieze and architrave to the main cornice is carved. The front of the building between the granite columns is of Bath stone. The windows are circular headed, with moulded architraves and carved key-stones, the spandrils over the windows being carved. The piers between and at the sides of the windows are rusticated, with moulded cornice and strings. At the sides of the windows are columns with carved caps and moulded bases. Immediately behind the granite columns are pilasters with Corinthian carved capitals. The entrance doorway has polished granite plinths and moulded bases on each side, with polished granite columns and carved Corinthian capitals, supporting a moulded and carved pediment over. The wrought-iron railing and gate claim special attention. The interior of the premises comprise, on the ground floor, entrance lobby, hall, secretary's office, telephone room, and the main Stock Exchange. The Exchange is elaborately furnished, and the walls are lined round with richly-polished walnut panels to a height of about 9 ft. The central doorway to the Exchange has two granite columns with carved Corinthian caps and moulded and panelled bases on each side of the doorway, the central doorway having moulded enriched arch over, resting on cornices supported by granite columns, caps, and bases. In the centre of the wall facing the door is a chimney-piece rising to a height of about 14 ft., an arrangement of polished walnut pilasters with arch between, framing a piece of wood sculpture. This panel, which is about 5 ft. 6 in. wide by 3 ft. 6 in. high, was carved by Mr. Benjamin Creswick. The title of the panel is "Commerce Uniting the Nations." The floor of the Exchange is fitted up with seats and desks for each member, the seats being upholstered in green morocco, and the desks having sliding tops and drawers. There are also telegraph desks and other accommodation for admitted clerks. The Exchange itself is fitted with chandeliers and brackets, and these, as indeed the whole of the building, will be electrically lighted. The basement floor has been laid out so that it is practically as light as the Exchange. On descending the staircase the tiled coves or niches, in which are to be placed bronze figures holding electric lights, and the wrought iron balustrade are noticeable features. The chamber immediately beneath the Exchange-room is of the same dimensions as the Exchange, and will be used as a library. The room is furnished in much the same manner as the Exchange. It has bookcases, desks, and seats, with chairs and lounges in crimson morocco, whilst walnut woodwork panelling is carried up to a height of about 8 ft. Here again the chimney-piece is made the chief feature of the apartment. Adjoining the basement hall is a series of lavatories and general offices. The whole of the walls of the approach and staircase are lined with tiles of special design, whilst the walls of the Exchange and library are of oak. The architect of the building is Mr. Henry Williams. The builders were Messrs. Cowlin & Son, and the whole of the furnishing has been carried out by Messrs. Smith & Co.—*Bristol Times.*

NEW OPERATING THEATRE, LYNN HOSPITAL.—On the 30th ult. the Countess of Leicester opened new buildings at the West Norfolk and Lynn Hospital, King's Lynn. On the ground floor are a washhouse, laundry, and drying closet, and the first floor contains the operating theatre, two ante-rooms, and a passage dividing them from the older part of the building, access to which is obtained through two doorways, direct communication with the outside being given by means of an iron staircase. The two ante-rooms (one of which has a doorway opening upon the passage) communicate with each other and with the operating-room through openings fitted with sliding doors. The building was designed by Mr. Herbert J. Green, of Lynn and Norwich, whose local representative (Mr. J. L. Carnell) has been largely responsible for the supervision of the work, and this has been carried out by Mr. A. F. Foreman.

SANITARY AND ENGINEERING NEWS.

WATER SUPPLY, CHELMSFORD.—A public inquiry was held at the Corn Exchange, Chelmsford, recently before Mr. W. A. Ducat (Local Government Board Inspector), into the application by the Chelmsford Town Council for permission to borrow 16,000*l.* for purposes of water supply, including the construction of a new reservoir with a capacity of 670,000 gallons, at Long Stomps. The 16,000*l.* included 9,400*l.* for permanent plant at the new bore well in the Mildmay-yard, and 6,600*l.* for the proposed additional reservoir. Mr. P. Griffiths said he was called in to advise the Council in November, 1901. A fourteen days' test had been made at the new boring. From the result of that test, and from other data, he felt satisfied that 10,000 gallons an hour could be obtained from this boring. The supply to part of the town, in fact, had been maintained during the interval of eighteen months from this boring.

RESERVOIR, LLANELLY.—Mr. W. Wilkins, J.P., Chairman of the Llanelly Borough Council, recently opened the new reservoir which the Council have constructed in the upper part of the Lliedi Valley. The new reservoir has a capacity of about 200 million gallons, and it practically doubles the storage at the disposal of the Council. Mr. Barnes (London) and Mr. George Watkeys, Borough Surveyor, were the joint engineers in the undertaking, the contractor being Mr. L. P. Nott.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—Mr. Arthur T. Bolton, architect, has removed from No. 2, The Sanctuary, Westminster, to Victoria Mansions, 28, Victoria-street, Westminster, S.W.

IMPROVEMENT IN GERMAN BUILDING TRADE.—In a report on the trade and commerce of the consular district of Frankfort-on-Main, Mr. Consul-General Oppenheim mentions that the prospects of business in Germany certainly improved during the year 1902: "Markets have stiffened and business is characterised by a relatively lively export trade and by an increase of the goods traffic on railways." He adds that the building trade also revived, as the increased demand for dwellings for the growing population had to be satisfied, and this brought employment to a number of allied trades.

MANCHESTER SHIP CANAL.—The half-yearly Report of the Chief Engineer, Mr. H. Hunter, states that the depth of water in the ship canal and docks has been fully maintained by means of the dredging plant throughout the entire length of the waterway. The quantities of silt and sludge deposited in the upper reaches of the canal and docks have increased rather than diminished during the half-year. The deepening of the approach channel below the locks at Eastham has been practically completed. The timber work required for the formation of a leading jetty at the inner or southerly end of Eastham Locks has been commenced. Spare steel gates for the upper end of the 80-ft. lock have been ordered and are in course of construction. The coaling basin at Partington has been lengthened at both ends on the northerly side, and additional dolphins have been constructed for the better accommodation of steamers at the tips. The lengthening on the southerly side is in progress. A considerable addition to the railways and sidings in connexion with the coaling basin is being effected. Temporary steel gates have been constructed and erected at the upper end of the 65-ft. lock at Barton, in order to replace those damaged by the s.s. "Winkfield," and temporary steel gates to replace the lower gates are in course of construction. The timber work required for the formation of a leading jetty at the upper end and on the northerly side of the large lock at Barton is in progress. The open space in the timber work in the centre of Trafford Wharf has been filled up so that the wharf is now continuous from one end to the other. The lines of railway on the westerly side of Trafford Wharf-road are being extended to the northward. A number of additional railway sidings, service roads, timber storage ground, and a new cart road are in course of construction at Weaste on the land acquired there. The embankments and slopes of the canal generally are in good condition, and the works throughout have been efficiently maintained. The construction of the new dock under Mr. Henry Lovatt's contract with the Manchester Dock & Warehouse Extension Company is proceeding. More than one-half of the excavation has been removed and the concrete work in the foundations of the transit sheds and in the southerly wall of the dock is in hand. The contract for the ferro-concrete work for the new transit sheds on the southerly side of the dock has also been let to Mr. Lovatt, and the work is proceeding. Several other contracts in connexion with these sheds have been let by the Manchester Dock & Warehouse Extension Company.

A NEW RAILWAY LEVEL.—In the new level recently introduced by Messrs. Stanley & Co., a new system of manufacture is adopted giving greater strength and rigidity than heretofore, and at the same time reducing weight and the number of separate parts. The centre is cast in one piece, with, and directly upon, the telescope and object end, and the cast telescope body is cored out to a suitable thickness, thus avoiding the necessity for several separate soldered and screwed pieces. The rack is fixed under the draw tube, and the pinion is fitted from side to side of the outer body, being spindled at each end so that the pinion has a double bearing. The level has clamp and tangent adjustment, tribrach levelling, and locking-plate, making the instrument available for use upon a wall or masonry, as well as upon a tripod. Either webs, platinum-iridium points, or glass stadia diaphragm may be fitted at the option of the user. The two latter are set for 1 : 100 stadia reading, in order that the distance of the staff may be read in the telescope without other measurement. Although specially designed for railway work, this new level is well adapted for any hard wear and should be found serviceable in building operations. It is claimed by the makers that with ordinary care the instrument will keep in perfect adjustment for a lifetime.

LIVERPOOL WATER SUPPLY.—The annual report of the Liverpool water engineer, Mr. J. Parry, upon the Corporation Waterworks has just been issued to the members of the City Council. The total volume of water delivered from the works during the year, including compensation waters to rivers in Lancashire and Montgomeryshire, was:—In gallons, 17,572,202,000; in cubic feet, 2,816,058,000; and in tons, 78,447,000; and the increases over the previous year are shown by the following figures:—Increase of population in and around Liverpool, 9,233; increase in total quantity of water distributed in same area, 279,147,000 gallons; increase in quantity sold by meter for trade purposes in same area, 137,766,000 gallons; and increase in quantity sold by meter outside of compulsory area, 18,473,000 gallons. The average consumption per day was 26,992,000 gallons, and the demand has fluctuated from 18,650,000 to 34,188,000 gallons per day. Water was used from the street hydrants for the extinction of 161 fires in 1902. The total number of tenants on the rent roll of the water account at the close of the year was 184,467. Mr. Parry also gives a short history of the salt water supply in view of the fact that the time is approaching when a new scheme will have to be submitted for dealing with the matter. He adds, "Whenever a deficiency of water has been experienced and the question of an increased supply for the town has been under consideration, proposals have been made to supply salt water from the river for purposes not requiring fresh water, but the cost of any scheme involving the duplication of mains throughout the district has always been found to be altogether out of proportion to the relief that could be afforded or the benefits that would be derived." The total length of salt water mains already laid is 4 miles 120 yards. During the year, additional distributing and fire mains were laid to the length of 11 miles 912 yards. The number of new fire hydrants fixed was forty-eight, and of hydrants substituted for fire-plugs, 216, making the total number of hydrants fixed during the year, 264.

GOTHENBURG WOOD MARKET.—In a Consular Report just received at the Foreign Office from Mr. Duff, the British representative at Gothenburg, it is stated that the anticipations of an improvement in the timber trade in 1902 seem to have been fulfilled, and that there is reason to believe that the result of the year's transactions was, on the whole, fairly satisfactory to buyers as well as sellers. Fortunately, stocks at the beginning of the year were of moderate size at those centres of consumption which give tone to the market at large, and the exports during January to March having been comparatively limited, it soon became clear that a change for the better had taken place, and that prices, which in

many places were unwarrantably low, might well be advanced. The quotations which had already been somewhat raised, and, in consequence of an expected late opening of the shipping season, appeared to warrant a further rise, gave impulse to increased activity and desire to resume buying. Negotiations consequently became very brisk, and enabled Swedish settlers during the four months, May to August, to dispose of the major portions of their stocks, not only for delivery during the summer, but also for autumn shipment. The consequence of this activity was large shipments during August and September. This produced a reaction, which, without occasioning a decline of prices, gave warning of the necessity of exercising caution —a state of affairs which continued up to the close of the year.

Demolition of Property in Westminster.—In the House of Commons a few days ago Mr. Channing asked the hon. Member for West Derbyshire, as representing the First Commissioner of Works, whether he had considered the proposals of the Ecclesiastical Commissioners to demolish the old residential quarter immediately south of Westminster Abbey and Deanery Garden, with a view to selling the sites for important commercial buildings; and, whether, having regard to the undesirability and risk of erecting lofty buildings close to the Abbey, his Majesty's Government would make representations to the Ecclesiastical Commissioners or take other steps to prevent this proposal from being carried out.—Mr. V. Cavendish: This is a matter which does not come within the jurisdiction of the First Commissioner of Works. But he would strongly deprecate any building scheme which might impair the safety or amenity of the Abbey.—Mr. Channing: Has the Commissioner of Works no power over the height of works adjacent to such a building as Westminster Abbey?—Mr. V. Cavendish: I am afraid we have no such power.

CAPITAL AND LABOUR.

The Joiners' Strike at Sunderland.—There seems every probability of a lock-out occurring in connexion with the operative joiners employed in the northern counties, this serious situation being, of course, largely attributable to the present Sunderland joiners' strike. The notices, which state that the lock-out will take effect on August 29 next, will be issued by Mr. W. H. Hope, of Sunderland, the Secretary of the Northern Counties' Federation of Building Trade Employers. If the dispute is not settled by a lock-out, the Federation will then call upon the Yorkshire, Lancashire, and the Cheshire Federations, which combine to form the northern centre of the building trade employers, and with whose approval the present steps are being taken.—*Newcastle Chronicle.*

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

7,785 of 1902.—A. Cunningham: *Windows.*

In windows, the hingeing or moving of the upper sash frame by pivots working in vertical and horizontal slots in a bracket screwed to the fixed frame of window.

15,008 of 1902.—D. T. Bostel, F. J. Bostel, and E. Bostel: *Fire Grates or Fire Places.*

A fire-place or fire-grate having a back which is adapted to lean forwardly or rearwardly, or to be vertical at will.

15,237 of 1902.—A. Mauchain: *Desks.*

An adjustable desk characterised by two metallic side standards connected with each other by means of wooden pieces, combined with a frame for supporting the table of the desk, said frame being pivoted on the side standards and being adapted to be set at different inclines by means of two racks with laterally projecting teeth, provided one at each side of the frame, and of a horizontally moving locking bar, said bar being arranged in such a manner that when the same is turned parts of the extremities of the bar are simultaneously introduced between two teeth of each rack so as to reach beyond the teeth on both sides.

21,106 of 1902.—C. Hass: *Construction of Nail, Spike, or Other Driven Holdfast.*

A nail, spike, or other driven holdfast constructed with the point portion tapering and of smaller diameter throughout the length than the body of the nail, and grooving a portion of the nail down to the base of the point so as to form a series of straight cutting edges surrounding the base of such point that on the nail being driven into the wood the cutting edges will cut their way through the wood and the grooves compress the fibre of the wood between the cuts and whereby the splitting of the wood is prevented.

23,163 of 1902.—H. T. Fenlon: *Hot Water or Steam Heater or Radiator for Buildings and the Like.*

The construction of heater consisting of the combination of a series of radiator tubes joined together, a circulating boiler connected to said radiator tubes, a source of heat affixed near thereto, a filling cup at the upper part, a steam valve in said filling cup, draw off and air taps.

25,490A of 1902.—H. R. Antcliff: *Locks.*

Providing locks with an all through solid-walled tubular passage or key-hole, and with engagement key ways cut in the back plate of the lock communicating with said tubular passage or key-hole, and also with the mechanism of the lock.

4,651 of 1903.—R. A. Skelton and E. J. Riley: *Billiard, Dining, and Like Tables.*

A device, of which several are used for each table, by which the top of a table can be raised, consisting of two metal plates shaped to slide one upon the other, one of the said plates being fixed to the rail of the table, and having grooves and a recess formed in it for a freely sliding pin or bolt in the other plate, which is attached to the table top, and is preferable provided with means by which the top of the table can be adjusted to correct level

7,476 of 1903.—W. Heatley; *Metal Lifts for Sashes and the Like.*

The manufacture and use of lifts formed from metal by stamping or otherwise, for the inner faces of window sash stiles and vertical bars

10,513 of 1903.—T. Potterton: *Kitchen Ranges and Boilers therefor.*

In a kitchen range flues arranged and controlled in such a manner, as to divert the passage of flames and products of combustion either to the top of the oven and the outer side or to the inner side and bottom of the oven independently or conjointly.

11,142 of 1903.—S. D. Lewis and H. M. Fessenden: *Combined Ventilator and Weather-shield for Windows and the Like.*

A combined ventilator and weather-shield, comprising, in combination, a plurality of angularly adjustable dependent shield sections, means for supporting the device in a window, and means for angularly adjusting the shield-sections.

11,512 of 1903.—V. Demerbe: *Tramways or Trackways for Common Roads.*

The invention consists in the employment of concrete tracks, with metal for the running or wearing surface of the trackway, and in the mode of laying the same to ensure solidity and security. In carrying out this invention the metal bar, girder, or sleeper, having a trough-section with downwardly-splayed sides, is employed, and this sleeper is placed in an inverted position on a concrete foundation and is packed internally with concrete, thus producing a slight concrete track of suitable depth and width, with an outer shield of metal, which forms the wearing surface.

11,919 of 1903.—G. R. Hill: *Hinges.*

A hinge comprising a leaf adapted to be secured to the door frame, a second leaf hinged to the first leaf, stems rigidly projecting from the second leaf, and adapted to loosely operate between the opposite faces of the door, the plate secured to the face of the door, and means for adjustably coupling said plate to the hinge.

11,929 of 1903.—A. G. Roodhuizen: *Apparatus for the Automatic Opening and Closing of Doors in Lifts and the like.*

An apparatus for automatically opening and closing doors in lifts and the like, comprising a groove in the form of a screw-thread running down the door shaft forming the axis of rotation of the door, which groove from one end of the shaft up to the middle turns through 90 deg., and from there up to th other end turns in a reverse direction through 90 deg., and in which groove, when the catc passes a door opening, a rod fixed on the catch engages, so that by the movement of the catch in either direction the door is opened and again closed.

12,517 of 1903.—C. B. S. Möller: *Locks or Fastenings for Doors.*

A lock having a lockable bolt or latch, the tumbler of which serves both for locking said bolt and for moving it into the lock-case, by means of the door handle, the said tumbler being pivotted in the lock-case with its free end adapted to slide on an inclined surface on the bolt, so that when the tumbler is moved, it moves the bolt so as to allow of opening the door.

12,566 of 1903.—F. E. R. Okrassa: *Hand Saws*

In a hand saw having a handle bar and arms thereon, the arrangement of the headed hollow shanks engaging loops on the free ends of the arms, and the blade holders adjustable lengthwise in the said shanks and engaging the ends of the saw blade.

12,748 of 1903.—G. T. McCaw and H. R. Vaughan: *Fastening or Securing Ridge Tiles in Position on Roofs.*

Fastening a ridge tile immovably in place by means of a roll, strip, or bead, or its equivalent, secured to the ridge piece or other suitable part of the roof, said roll strip, or bead, or equivalent fitting in the tile and holding it in place.

12,846 of 1903.—H. Birkbeck (New York Lock Co.): *Attachment for Door Knobs.*

A knob adapted to receive a spindle, a locking plate adapted to engage said spindle, and plate-shifting means capable of a sliding and of an independent rotary motion.

15,768 of 1902.—Sutcliffe, Spearman & Co., Ltd., and E. R. Sutcliffe: *Process for Making Artificial Stone, Bricks, Paving Flags and the Like.*

A process of manufacturing artificial stone goods, having a calcareous cement as a binding medium, which consists in thoroughly grinding the raw materials adding thereto a proportion of cement in the form of a slurry previously prepared with hot water at or near the boiling point, and in the presence of heat, mixing of the materials until the cement is fully incorporated therewith, moulding the mixture to the required shapes in a press, which removes the excess of moisture out of the material, and finally treating the moulded pieces with heat and steam in a closed hardening chamber.

16,100 of 1902.—K. Heinrich and T. Haardt: *Fireproof Material.*

A solid fireproof material resembling stone, the said material consisting of a mixture in suitable proportions of asbestos, blast furnace passed from a Cowper's hot blast stove, Portland cement and water, the whole being incorporated so as to form a more or less consistent pulp, which can be moulded into any desired shape and afterwards dried.

17,476 of 1902.—R. W. B. Creeke: *Apparatus used in the Mixing of Concrete.*

In apparatus used in the mixing of concrete, the use of a hinged shoot whose position is determined by the mixing drum.

28,668 of 1902.—C. E. Price: *Joints for Rods for Cleansing Drains, Running Cables through Pipes, and the Like.*

A joint-fitting for rods that has a centrepiece which when turned will lock or unlock the joint, according to the direction in which it is turned, the screw entering the centre piece, having a square or other shaped head or projection, with or without a cut out.

3,175 of 1902.—H. Aiken: *Roof Structures.*

A roof structure having a series of trusses parallel with each other, and alternate roof surfaces at different levels extending between the trusses and affording intermediate space for admission of light.

5,369 of 1903.—A. A. Raymond and W. L. Ross: *Piles or Foundation Elements and the Method of Constructing the Same.*

A shell for piles comprising a plurality of shell sections, the said shell sections being adapted for interlocking engagement when longitudinally distributed, in combination with a conveying tube in mechanical engagement with the innermost section whereby soil beneath said shell sections may be removed to effect longitudinal distribution of said shell sections in the earth.

6,158 of 1903.—C. H. Stephenson: *Garbage Receptacles.*

A garbage receptacle having a hinged primary cover formed with a garbage receiving mouth, a secondary cover hinged to the primary cover and adapted to cover said mouth, and operating member supported by the primary cover and movable independently thereof, and connexions between said member and the secondary cover, whereby a movement of the operating member is caused to raise the secondary cover.

7,976 of 1903.—F. R. A. Sundell: *Methods of Covering Walls or Ceilings and Compositions therefor.*

A method of covering walls, characterised thereby that the mass which is to form the surface layer (the surface mass) of the covering is in a wet condition placed on a suitable movable support, for instance, a glass plate, that the surface mass is thereupon caused to assume a firmer e.g. (jelly or dough like) consistency, and that when the support has thereafter been placed near the inner wall, which is to be covered, in such a manner that a space between the wall and the surface mass is left, a mass (binding mass) is poured into this space, which mass, when setting binds the surface mass to the wall, whereupon, when the binding mass is set, the support (glass plate) is removed.

12,264 of 1903.—F. Blivet: *Sound-proof Floorings.*

A sound-proof or hollow flooring having its interior divided into distinct spaces by mats or sheets.

12,701 of 1903.—W. N. Wight: *Floorings and Other Concrete Structures.*

In a flooring, the combination of supporting beams and a concrete structure moulded in place between said beams comprising upper and lower plates of concrete spaced apart from each other at their intermediate portions and united at their ends, said lower plate being provided with wire netting embodied in the plate and extending continuously therein and increasing its tensile strength, said netting being embodied in and over and between a number of said beams.

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

12,899 of 1903.—A. GASPANY: *Moulding Machine for Artificial Stones.*

A machine for simultaneously moulding a large number of artificial stones, in which the mould, formed of two sides and a number of sliding division plates, is open at both ends, and the tracks which bridge over the mould and serve for moving the filling box are removably arranged so that, after the stones have been duly formed, the tracks can be swung sideways or downwards in order to release the bottom of the mould for the purpose of effecting the simultaneous removal of the moulded material, the tracks being so arranged that the filling-box, which is moved over the mouth, is held suspended above the same at such a height that the mould is over-filled to an extent necessary to facilitate the compression of the material.

MEETINGS.

TUESDAY, AUGUST 11.

Institute of Builders.—Council meeting. 4 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

July 23.—By WALTON & LEE (at Dartmouth).

Stoke Fleming, Devon.—Woodbury Farm, 155 a. 0 r. 4 p., f. £4,000
Freehold house and 6 a. 0 r. 34 p., y.r. 11*l.* 225
Enclosures of land, 54 a. 2 r. 35 p., f. 750
Bugford and Hillfield farms, 208 a. 1 r. 25 p., f. 4,510
Hillfield Cottage and 5 a. 1 r. 19 p., f., y.r. 30*l.* 700

July 24.—By COBBS (at Sittingbourne).

Lower Halstow, Kent.—A freehold cottage and 2 a. 3 r. 26 p. 600
Ash Wood Field, 3 a. 3 r. 20 p., f. 250
Newington, Kent.—Snakesbury hop-garden, 4 a. 0 r. 10 p., f. 400
Freehold hop-land, 2 a. 3 r. 19 p. 290
Two freehold cottages and 5 a. 1 r. 7 p. 770
Road Garden Orchard, 1 a. 3 r. 35 p., f. 410

By BRUTON, KNOWLES, & Co. (at Stroud).

Miserden, Glos.—The Camp Farm, 208 a. 3 r. 29 p., f. 2,100

July 25.—By COBBS (at Canterbury).

Ash, Kent.—King's Head or Richborough Farm, 118 a. 3 r. 27 p., f. 2,200
Sturry, Kent.—Georgie's Enclosure, 3 a. 1 r. 27 p., f. 200
Small Gains and Broad Oak Meadow, 6 a. 2 r. 6 p., f. 195
Freehold Woodland, 28 a. 2 r. 18 p. 350
Sturry, Kent.—Freehold Rectorial Tithe Rent-Charges of 68*l.* 6,600

By PETLEY'S (at Canterbury).

Sturry, Kent.—Little Walnut Tree Farm, 40 a. 0 r. 2 p., f. 1,000
Bridge, Kent.—Freehold house and shop, q.r. 40*l.* 600

July 27.—WATERER & SONS.

Staines, Middlesex.—The Knowle Green Brewery, with 94 tied houses, f. (including goodwill) .. 202,000

By GOODMAN & CROWTHER.

City of London.—61, Aldersgate-st., s., area 1,785 ft., f., y.r. 560*l.* 7,500

By WM. HOUGHTON.

Leyton.—11, 13, 15, 19, and 21, Amberley-rd., f., e.r. 130*l.* 1,300
14 to 22 (even), Amberley-rd., f., e.r. 130*l.* 1,290
112, 114, and 116, Grove Green-rd., f., e.r. 80*l.* 142. 795
Walthamstow.—58, 60, and 62, Queen's-rd., f., w.r. 70*l.* 4s. 930
Stroud Green.—48, Victoria-rd., u.t. 70 yrs., g.r. 6*l.* 10s., y.r. 44*l.* 415

By JENKINS & SONS.

Deptford.—1, Charles-st. (shop, also stabling), f., y.r. 32*l.* 320

By NORRIS, SON, & HADLEY.

Holloway.—George's-rd., f.g.r. 18*l.*, reversion in 19 yrs. 450
Clapham.—28, Little Manor-st., f., y.r. 120*l.* 1,575

By A. SAVILL & SONS.

Rochford, Essex.—Main-rd., enclosure of building land, 23 a. 1 r. 29 p., f. 1,100
Enclosure of building land, 0 a. 3 r. 26 p., f. 175
Eastwood, Essex.—Cherry Orchard Farm, 44 a. 3 r. 12 p., f. 1,850
Little Wakering, Essex.—Cottage and market garden, 2 a. 2 r. 12 p., f. 380
Ashingdon, Essex.—Part of Beckney Wood, 22 a. 0 r. 4 p., f. 350
Rawreth, Essex.—Beeches Common, pasture land, 19 a. 1 r. 8 p., f. 260
Canvey Island, Essex.—Round House Farm, 51 a. 0 r. 13 p., f. 270

By C. SPARROW & SON.

Oakleigh Park.—Drumna House and 1¼ a., f., p. 2,500

By A. H. TURNER & Co.

Woking, Surrey.—Mount Hermon, Northaw Lodge and ¾ a., f., p. 2,375

By NORMAN & SON (at Stratford).

Leytonstone.—Barclay-rd., Homelea, f., y.r. 3*l.* 425
Leyton.—Grosvenor-rd., four plots of land, f. 240

July 28.—By ARTHUR BARTON.

Lea.—Burnt Ash Hill, Lynton and ½ a., u.t. 77 yrs., g.r. 10*l.*, p. 1,200

By L. CAVEY & Co.

Forest Hill.—35 and 37, Dalmain-rd., u.t. 76½ yrs., g.r. 9*l.*, w.r. 72*l.* 16s. 400

By CHAMBERS, GIET, & FORD.

Clapton.—157, Glynn-rd., u.t. 72 yrs., g.r. 4*l.* 7s. 6d., y.r. 36*l.* 8s. 260

By GRAVES & SON.

Streatham.—80 to 86 (even), Eardley-rd., s., f., y.r. 135*l.* 2,500

By H. S. HAWLEY & Co.

High Holborn.—No. 159, s., beneficial lease for 13¾ yrs., y.r. 75*l.* 410
Strand.—11, Houghton-st., s., f., y.r. 50*l.* 1,500

By HUMBERT & FLINT.

Soho.—25A, Lisle-st. (White Bear-yard—stabling), u.t. 76½ yrs., g.r. 133*l.* 4s., e.r. 700*l.* 6,300

Hammersmith.—3, 4, 5, 6, and 7, Hughenden-rd., u.t. 83¾ yrs., g.r. 21*l.* 5s., w.r. 208*l.* £1,500
13, Berestede-rd., u.t. 83½ yrs., g.r. 4*l.* 5s., w.r. 41*l.* 12s. 340
Lewisham.—33, Gilmore-rd., u.t. 54½ yrs., g.r. 6*l.*, e.r. 40*l.* 310

By NICHOLAS, DENYER, & Co.

Battersea.—46 to 64 (even), Wilson-st., u.t. 49½ yrs., g.r. 39*l.* 10s., w.r. 218*l.* 8s. 1,300
8 to 20 (even), Hope-st., u.t. 55 yrs., g.r. 12*l.*, w.r. 109*l.* 4s. 735

By RUTLEY, SON, & VINE.

Euston-road.—No. 177, f., y.r. 122*l.* 1,390
290, Stanhope-st., u.t. 18 yrs., g.r. 8*l.*, w.r. 87*l.* 2s. 290
St. Pancras.—40, Chalton-st., s., u.t. 34 yrs., g.r. 8*l.*, y.r. 55*l.* 10s. 460
Tottenham.—6, Station-rd., f., w.r. 29*l.* 18s. 235
Wood Green.—1 to 5, Lordship-cottages, u.t. 60 yrs., g.r. 12*l.* 10s., w.r. 97*l.* 10s. 530
Peckham.—43, Blenheim-gr., f., y.r. 28*l.* 440
Chadwick-rd., f.g.r. 9*l.*, reversion in 66 yrs..... 215

By WESTON & SONS.

Brixton.—Carlton-gr., the Brixton Club and the Carlton Hall adjoining, f., p. 2,800
Tunstall-rd., f.g.r. 55*l.*, reversion in 87 yrs. 1,375

By BOYTON, SONS, & Co. (at Fulham).

Fulham.—204, 206, 208, and 208A, New King's-rd., s., u.t. 93 yrs., g.r. 35*l.* 10s., y.r. 185*l.* .. 1,730

By W. & B. HOBBS (at Ashford).

Kennardington, &c., Kent.—Kennardington-pl. or Cross Farm, 129 a. 1 r. 32 p., f., y.r. 130*l.*.. 1,700

July 29.—By ARBER, RUTTER, WAGHORN, & BROWN.

New Bond-street.—No. 47; also 60, Maddox-st., s., area 1,300 ft., Corporation lease, g.r. 6*l.* 15s., fine 47*l.* 5s., y.r. 245*l.* 20,200

By BLAKE & DANNATT.

Peckham.—16 and 18, Wellington-rd., u.t. 65 yrs., g.r. 12*l.*, y.r. 68*l.* 750
Dulwich.—2 and 4, Dunstan's-rd., s., with stabling, &c., u.t. 62 and 66 yrs., g.r. 6*l.*, y.r 63*l.* 8s. 445

By HIND & SONS.

St. George's East.—22, Cannon-st.-rd., u.t. 99 yrs., g.r. 7*l.* 7s., w.r. 36*l.* 8s. 350

By R. TIDEY & SON.

Shoreditch.—24 and 26, Brunswick-st., f., y.r. 44*l.* 725
32, Dunloe-st., f., y.r. 35*l.* 570
Preston-on-Wye, &c., Hereford.—The Lower House Estate, 200 a. 1 r. 11 p., f., y.r. 275*l.*... 5,000
Bishop's Froome, Hereford.—Swill Villa and 9 a. 1 r. 39 p., f., y.r. 35*l.* 805

PERKINS & SONS (at Southampton).

Braishfield, Hants.—Taunton Vale Farm, 64½ a., f. 2,000

F. WINTERTON (at Harringay).

Harringay.—104, Rutland-gdns., u.t. 87 yrs., g.r. 6*l.* 6s., e.r. 34*l.* 325
Hornsey.—88, Raleigh-rd., u.t. 79 yrs., g.r. 6*l.* 6s., e.r. 34*l.* 335
King's Cross.—22, Canal-ter., u.t. 39¾ yrs., g.r. 4*l.*, w.r. 36*l.* 8s. 220

THORNBORROW & Co. (at Shap).

Bampton, &c., Cumberland.—Toothmain and Rawhead farms, 53 a. 2 r. 21 p., f. 2,000

July 30.—BISLEY & SONS.

Bermondsey.—18, Southwark-pk.-rd., u.t. 16 yrs., g.r. 4*l.*, e.r. 36*l.* 190
Clacton-on-Sea, Essex.—Ellis-rd., a freehold building plot 150
Frinton-on-Sea, Essex.—Station-rd., two freehold shop plots 140

By CHANCELLOR & SONS.

Richmond Hill.—15, Cardigan-rd., u.t. 73 yrs., g.r. 12*l.* 10s., y.r. 90*l.* 995
Staines, Middx.—Gresham-rd., Winkfield, f., y.r. 40*l.* 650
52 and 54, Richmond-rd., f., y.r. 36*l.* 500
44 to 50 (even), Richmond-rd., with plot of land, f., y.r. 82*l.* 1,210

By J. G. DEAN & Co.

Balham.—Ouseley-rd., f.g.r.'s 13/., reversion in 12 yrs. 338

By FISHER, STANHOPE, & DRAKE.

Stoke Newington.—243, Amhurst-rd., u.t. 60¾ yrs., g.r. 7*l.* 7s., y.r. 65*l.* 550

By G. HEAD & Co.

Camden Town.—Moiety of interest in 19, 21, 22, 24 to 28, 43 to 51 (odd), Bayham-pl.; 4, 5, 6, 7, and 12, King's-yard, and 9, Camden-st. (houses, cottages, stabling, and factory), u.t. 27 and 49 yrs. g.r. 224*l.*, y.r. 849*l.* 6s. (in one lot) 1,400

By HEDGER & MIXER.

Edgware, Middlesex.—Edgware-rd., St. Albans Lodge and 2½ a., f., p. 2,500

By HOLCOMBE, BETTS & WEST.

Harringay.—116, Fairfax-road, u.t. 85 yrs., g.r. 5*l.*, w.r. 33*l.* 16s. 200

By LINNETT & LANE.

Willesden.—Barry-rd., Gordon House, f., e.r. 36*l.* 8s. 460
Harlesden.—21, Nicoll-rd., u.t. 69 yrs., g.r. 8*l.*, e.r. 60*l.* 570

By C. C. & T. MOORE.

Bow.—1 and 3, British-st., f., y.r. 62*l.* 1,100
Forest Gate.—49, Latimer-rd., f., e.r. 30*l.* 420
Mile End.—229, Burdett-rd., u.t. 70 yrs., g.r. 7*l.*, y.r. 45*l.* 500
Clapton.—82 and 84, Overbury-st., f., w.r. 59*l.* 16s. 550
92 and 94, Overbury-st., f., w.r. 59*l.* 16s. 550
Islington.—16 and 18, Arlington-st., u.t. 24 yrs., g.r. 8*l.* 8s., y.r. 70*l.* 505

By STIMSON & SONS.

Camberwell.—102, Boyson-rd., u.t. 48 yrs., g.r. 5*l.* 5s., y.r. 38*l.* 390
Balham.—21 to 31 (odd), Temperley-rd., u.t. 75 yrs., g.r. 33/., y.r. 176*l.* 1,700
Wandsworth-rd.—42, New-rd., s., u.t. 58 yrs., g.r. 5*l.*, w.r. 41*l.* 12s. 275
Walworth.—27 and 28, Sutherland-sq., u.t. 39 yrs., g.r. 8*l.*, y.r. 66*l.* 530
New Kent-rd.—46A, Adam-st. (steam joinery works), u.t. 68 yrs., g.r. 30*l.*, e.r. 150*l.* (including machinery and plant) 800

Forest Gate.—Reginald-rd., f.g.r. 12*l.* 12s., reversion in 75 yrs. £290
Bexley Heath, Kent.—1, 2, and 3, Shirley-cottages; also Union Cottage, f., w.r. 105*l.* 12s. 940
Fulham.—1A, Strode-rd., u.t. 76 yrs., g.r. 8*l.* 10s., y.r. 30*l.* 200

By WILLOUGHBY, SON, & Co.

Norwood.—27, Chestnut-rd., u.t. 88½ yrs., g.r. 10*l.*, y.r. 48*l.* 600

By WILTSHIRE & THURGOOD.

Lee.—2, Dorville-rd., u.t. 60 yrs., g.r. 7*l.*, e.r. 38*l.* 320
263, High-rd., u.t. 54 yrs., g.r. 14*l.* 16s., e.r. 80*l.* 540

By BATCHELAR & SON (at Croydon).

Warlingham, Surrey.—Stafford-rd., 80 plots of building land, f. 1,775

READ, STANFORD, & GAYFORD (at Beccles).

Brampton, Suffolk.—Brampton Old Hall Farm, 167 a. 1 r. 31 p., f., y.r. 61*l.* 13s. 9d. 1,900
Shaddingfield, Suffolk.—Shadingfield Church Farm, 131 a. 3 r. 6 p., f. 1,410
The Valley Farm, 80 a. 2 r. 26 p., f. 875

BOULTON & COOPER (at York).

Kirby Grindalythe, &c., Yorks.—The Duggleby and High Mowthorpe Estate, 2,803 a. 3 r. 24 p., f. 47,600

ERNEST OWERS (at Hampstead).

Hampstead.—49, 50, and 55, Achilles-rd., u.t. 81½ yrs., g.r. 17*l.* 3s., y.r. 116*l.* 1,230
25 and 30, Ulysses-rd., u.t. 81½ yrs., g.r. 11*l.* 18s., y.r. 76*l.* 815
11, 17, and 19, Agamemnon-rd., u.t. 81½ yrs., g.r. 18*l.* 15s., y.r. 115*l.* 1,260
32, Agamemnon-rd., u.t. 81½ yrs., g.r. 5*l.* 19s., y.r. 38*l.* 425

July 31.—F. DOD & Co.

Leytonstone.—Granleigh-rd., Park House, area 5,657 ft., f., p. 900
80 to 86 (even), 86A, 88, 88A, 90A, and 92, Lansdowne-rd., f., w.r. 211*l.* 18s. 1,710

By DOWNES & Co.

Cricklewood.—16 and 18, Howard-rd., u.t. 87 yrs., g.r. 13*l.*, y.r. 74*l.* 760

By HAMPTON & SONS.

Highclere, Hants.—Ivy House and 103 a. 1 r. 11 p., f. 7,000
East Molesey, Surrey.—Palace-rd., Greenway and half an acre, f. p. 2,200

By MARTEN & CARNABY.

Norwood.—34, Thurlestone-rd., f., e.r. 40*l.* 550
Dulwich.—10 to 24 (even), Thurlow Hill, f., e.r. 325*l.* 4,300

By JOSEPH STOWER.

Whitechapel.—Chicksand-st., &c., f.g.r. 75*l.*, reversion in 65 yrs. 1,720
Bayswater.—Chepstow Villas, f.g.r. 20*l.*, reversion in 41¼ yrs. 710

By VARLEY & LOCKING.

Stamford Hill.—1, St. Andrew's-rd., u.t. 76 yrs., g.r. 6*l.* 10s., e.r. 50*l.* 510
Islington.—319, Essex-rd., u.t. 31 yrs., g.r. 5*l.*, e.r. 48*l.* 375

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.			
Hard Stocks	1 15 6	per 1,000	alongside, in river.	
Rough Stocks and Grizzles.....	1 12 6	,,	,,	,,
Facing Stocks....	2 12 0	,,	,,	,,
Shippers	2 5 0	,,	,,	,,
Flettons	1 8 6	,,	at railway	depôt
Red Wire Cuts ..	1 12 6	,,	,,	,,
Best Fareham Red	3 12 0	,,	,,	,,
Best Red Pressed Ruabon Facing	5 0 0	,,	,,	,,
Best Blue Pressed Staffordshire ..	4 5 0	,,	,,	,,
Do. Bullnose	4 11 0	,,	,,	,,
Best Stourbridge Fire Bricks	4 8 0	,,	,,	,,
GLAZED BRICKS.				
Best White and Ivory Glazed Stretchers.....	13 0 0	,,	,,	,,
Headers	12 0 0	,,	,,	,,
Quoins, Bullnose, and Flats.....	17 0 0	,,	,,	,,
Double Stretchers	19 0 0	,,	,,	,,
Double Headers..	16 0 0	,,	,,	,,
One Side and two Ends.....	19 0 0	,,	,,	,,
Two Sides and one End	20 0 0	,,	,,	,,
Splays, Chamfered, Squints.....	20 0 0	,,	,,	,,
Best Dipped Salt Glazed Stretchers and Headers	12 0 0		,,	,,
Quoins, Bullnose, and Flats.....	14 0 0	,,	,,	,,
Double Stretchers	15 0 0	,,	,,	,,
Double Headers..	14 0 0	,,	,,	,,
One Side and two Ends.....	15 0 0	,,	,,	,,

[*See also page 170.*

COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Library Building	Borough of Heywood	30*l.*, 20*l.*, and 10*l.*	Sep. 14
*Plans for a New School	Gillingham U.D.C. Education Com.	Not stated	No date.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Bank Buildings, Exeter	Messrs. Prescott, Ltd.	E. H. Harbottle & Son, Architects, Exeter	Aug. 10
Road Works, Stanley-road	Bootle's (Lancs) Corporation	Borough Engineer, Town Hall, Bootle	Aug. 11
Additions to Station Buildings, Tenby	G. W. R. Company	G. K. Mills, Paddington Station, London, S.W.	do.
Church, &c., Newlyn Church		H. White, Architect, Penzance	do.
Workshops, &c., Wall-street	Glasgow Corporation	Sinclair & Ballantyne, Architects, 95, Bath-street, Glasgow	do.
Tenements, St. Margaret's-place	do.	City Engineer, 64, Cochrane-street, Glasgow	Aug. 12
Bridge Works	Farnham R.D.C.	A. J. Stedman, Architect, Farnham	do.
Additions to Municipal Buildings	Aberdeen Town Council	J. Rust, City Architect, 224, Union-street, Aberdeen	do.
Sewerage Works, Morton Grange	Houghton-le-Spring R.D.C.	W. Morley, Surveyor, Houghton-le-Spring	do.
Brick Culvert, Cromwell-grove	Levenshulme U.D.C.	J. Jepson, Engineer, Tiviot Dale, Stockton	do.
Drainage Works, Deeping Fen, Spalding	The Trustees	A. Harrison, Little London, Spalding	do.
Paving Works	Romsey R.D.C.	J. Jewey, Surveyor, Romsey	do.
Farm Buildings, Longrigg Green, Eskdale		J. H. Rea, Gatehouse, Eskdale	Aug. 13
Schools	Cummertrees School Board	A. S. Nichol, Annan (N.B.)	do.
Schools, Pill-street, Cogan	Penarth (U.D.) School Board	G. A. Birkenhead, Architect, Cardiff	do.
Stabling at the George Inn, Rastrick	Messrs. Ainley & Sons, Ltd.	J. Berry, Architect, 3, Market-place, Huddersfield	do.
Sewerage Works	Castletown (Ireland) R.D.C.	R. Evans, Civil Engineer, 53, South Mall, Cork	do.
Two Houses, Heaton (Yorks)		J. Ledingham, Architect, Bradford	Aug. 14
Nine Houses, Ala-road, Pwllheli, Wales		H. Thomas, Architect, 7, Castleditch, Carnarvon	do.
Schools, Rathmullan (Ireland)	Miss Gallagher	J. P. M'Grath, Architect, Londonderry	do.
Vestry, Pontlottyn, Wales		Fisher & Sons, Architects, Pontypool	Aug. 15
Sewers, &c.	Tadcaster R.D.C.	F. Massie, Civil Engineer, Tetley House, Wakefield	do.
Car Depot, Hook-road	Epsom U.D.C.	E. R. Capon, Surveyor, Council Offices, Bromley Hurst, Epsom	do.
Rebuilding Church, Newchurch, near Warrington		Travers & Ramsden, Architects, 44, Church-street, Leigh	Aug. 17
Sewage Disposal Works, Pleasley Hill	Mansfield Town Council	R. F. Valance, Borough Engineer, Mansfield	do.
Free Library, Hagley-road	Stourbridge U.D.C.	F. Woodward, Architect, Town Hall, Stourbridge	do.
Sewerage Works	Longton (Staffs) Town Council	J. W. Wardle, Civil Engineer, Town Hall, Longton	do.
Sewers, &c.	Wilton (Wilts) R.D.C.	Lemon & Blizzard, Civil Engineers, 38, Silver-street, Salisbury	do.
*2¼ miles Sewers, &c.	do.	do.	do.
*New Post Office at Ilford	H.M. Works	The Secretary, H.M. Office of Works, Storey's Gate, S.W.	Aug. 18
*Isolation Hospital Buildings	Acton District Council	Council's Surveyor, 242, High-street, Acton, W.	do.
Additions to Infirmary		E. Seward, Architect, Cardiff	do.
Sewers, &c.	Leatherhead U.D.C.	T. Salkield, Engineer, Leatherhead	do.
Road Metal, &c.	Mountain Ash U.D.C.	J. Williams, Surveyor, Town Hall, Mountain Ash	do.
Schools, &c.	Hasland (Derby) School Board	Rollinson & Son, Architects, 13, Corporation-street, Derby	do.
*Draining, Levelling, and Tarpaving Playgrounds	Wimbledon Education Committee	Thomson & Pomery, Architects, Hill-road, Wimbledon	Aug. 19
Additions to Parish Church, Llandilofawr, Wales		D. Jenkins, Architect, Llandilo	do.
Water Supply Works, Blaen-cwm-Clowyn, Cwmdu	Maestag (Wales) U.D.C.	J. Humpheys, Civil Engineer, Town Hall Chambers, Maestag	do.
*New Isolation Hospital	Upton-on-Severn R.D.C.	Lewis Sheppard & Son, Architects, 51, Foregate-street, Worcester	Aug. 20
Six Houses, Hough-lane, Wombwell	Mrs. E. Bashforth	A. B. Linford, Architect, Wombwell	do.
*Foundations of 10th County Lunatic Asylum (Epsom)	L.C.C. Asylums Committee	Clerk to the Committee, 6, Waterloo-place, S.W.	do.
*Out Relief Stores at Tooley-street	St. Olave's Union	Newman & Newman, 31, Tooley-street, S.E.	Aug. 21
Hospital	Colwyn Bay U.D.C.	W. Jones, Civil Engineer, Council Offices, Colwyn Bay	Aug. 24
Road Works, Basils and Grove-roads	Stevenage U.D.C.	W. O. Times, Council Offices, Stevenage	do.
Boiler House at Workhouse, Selly Oak	King's Norton Guardians	C. Whitwell & Son, Architects, Birmingham	do.
*New Branch Post Office, Barry Dock	Commissioners of H.M. Works, &c.	H.M. Office of Works, Storey's Gate, S.W.	Aug. 25
*Enlargement Head Post Office, Birmingham	do.	do.	do.
Storm Water Drainage Works, Upper Higham	Strood (Kent) R.D.C.	W. Brooke, Civil Engineer, Strood, Rochester	Aug. 28
*Sinking and Steming a Well, &c.	Kempston U.D.C.	Beesley, Son, & Nichols, 11, Victoria-street, Westminster, S.W.	Aug. 29
Warehouses at Docks, Cumberland Basin	Bristol Corporation	W. W. Squire, Engineer, Cumberland Basin, Bristol	Aug. 31
*New Public Offices, Morgan-street, Pontypridd	U.D.C. of Pontypridd	Clerk to the Council, District Council Offices, Pontypridd	Sep. 14
*Making-up and Paving, &c. Roads	Borough of Paddington	Borough Surveyor, Town Hall, Paddington, W.	Sep. 21
*Two Blocks of Flats, Wimbledon	Soldiers & Sailors Families Assoc.	C. E. Lancaster Parkinson, Architect, 44, Bedford-row, W.C.	No date.
Houses, Thurles		W. Maher, Main-street, Thurles	do.
House, Cockton Hill, Bishop Auckland		T. E. Davidson, Arch., 32, Clayton-street West, Newcastle-on-Tyne	do.
House, Bramhope, near Leeds		Child & Co., Architects, 149, Park-lane, Leeds	do.
Additions to Bagdale, Old Brewery, Whitby		H. G. Walker, Architect, Skinner-street, Whitby	do.
Club Premises, Woodhouse	Liberal Association	Buttery & Birds, Architects, 1, Basinhall-square, Leeds	do.
Additions to Winfrith House, Winfrith, nr. Dorchester	Mr. E. Hughes	F. B. Bates, Architect, Newport, Mon.	do.
Furniture Repository, Commercial-road, Hereford	Messrs. Greenlands, Ltd.	W. W. Robinson, Architect, King-street, Hereford	do.
Four Houses, Glyncorrwg, Wales		Daniel Lewis, Glyncorrwg	do.
Roads, &c. Liscard and Wallasey	Palmerston Land & Property, Co.	O. Roberts, Architect, The Temple, Dale-street, Liverpool	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Draughtsman (Engineer and Surveyor's Department)	Wimbledon U.D.C.	12*l.* per week	Aug. 10
*Quantity Surveyor	Fulham Borough Council	1½ per cent.	Aug. 31

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. x. *Public Appointments*, xi.

PRICES CURRENT (*Continued*).

BRICKS, &c.

	£ s. d.	
Two Sides and one End	15 0 0	per 1,000 at railway depot.
Splays Chamfered, Squints	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.
	s. d.	
Thames and Pit Sand	6 0	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime	20 6	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s cd. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depot	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1 8½	" "

PRICES CURRENT (*Continued*).

STONE.

PORTLAND STONE (20 ft. average)—

	s. d.	
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 1	per ft. cube.
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 2½	" "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.
Beer "	1 6	" "
Grinshill "	1 10	" "
Darley Dale in blocks	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "

PRICES CURRENT (*Continued*).

STONE.

YORK STONE—*Robin Hood Quality.*

	s. d.	
3 in. Sawn two sides slabs (random sizes)	0 11½	per ft. super. dld. rly. depôt
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
BEST HARD YORK— Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 3	per ft. super. "
6 in. Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. selected random flags	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld. rly. depôt.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
" " " 3 in. do.	1 2½	" "

PRICES CURRENT (*Continued*).

SLATES.

in.	in.	£ s. d.	
20	10 best blue Bangor	13 2 6	per 1000 or 1200 at rly. dep.
20	12 " " "	13 17 6	" "
20	10 best seconds "	12 15 0	" "
20	12 " " "	13 10 0	" "
16	8 best "	7 0 0	" "
20	10 best blue Portmadoc	12 5 0	" "
16	8 best blue Portmadoc	6 5 0	" "
20	10 best Eureka unfading green	15 8 6	" "
20	12 " " "	17 8 6	" "
18	10 " " "	13 10 0	" "
16	8 " " "	12 5 0	" "
20	10 permanent green	11 0 0	" "
18	10 " " "	9 5 0	" "
16	8 " " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1,000, at rly. depôt.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and valley tiles	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do.	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.	
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0	
Deals: best 3 by 9	14 10 0	15 10 0	
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0	
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.	
Deals: seconds	1 0 0	less than best	
Battens: seconds	0 10 0	" " "	
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0	
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0	
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.	
¾ in.	1 0 0	"	
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0	
Seconds	4 5 0	4 10 0	
Small timber (8 in. to 10 in.)	3 12 6	3 15 0	
Small timber (6 in. to 8 in.)	3 0 0	3 10 0	
Swedish balks	2 15 0	3 0 0	
Pitch-pine timber (10 ft. average)	3 5 0	3 15 0	

JOINERS' WOOD.

	At per Standard.		
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0	
3 in. by 9 in.	21 0 0	22 10 0	
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0	
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0	
" " 3 in. by 9 in.	17 10 0	19 0 0	
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0	
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0	
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0	
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0	
Do. 3 in. by 9 in.	18 0 0	19 10 0	
Battens	13 10 0	15 0 0	
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0	
Do. 3 in. by 9 in.	14 10 0	16 0 0	
Battens	11 0 0	12 10 0	
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0	
Do. 3 in. by 9 in.	13 0 0	14 0 0	
Battens	10 0 0	11 0 0	
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14 10 0	15 10 0	
" " 3 in. by 9 in.	13 10 0	14 10 0	
Battens	11 0 0	12 0 0	
Second white deals 3 in. by 11 in.	13 10 0	14 10 0	
" " " 3 in. by 9 in.	12 10 0	13 10 0	
" " " battens	9 10 0	10 10 0	
Pitch-pine: deals	16 0 0	18 0 0	
Under 2 in. thick extra	0 10 0	1 0 0	
Yellow Pine—First, regular sizes	33 0 0	upwards.	
Oddments	22 0 0	24 0 0	
Seconds, regular sizes	24 10 0	26 10 0	
Yellow Pine Oddments	20 0 0	22 0 0	
Kauri Pine—Planks, per ft. cube	0 3 6	0 4 6	
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6	
Small "	0 2 3	0 2 6	
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6	
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8	
¾ in. do. do.	0 0 6½	- - -	
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11	
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0	
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0	
Teak, per load	17 0 0	21 0 0	
American Whitewood Planks— Per ft. cube	0 4 0	- -	
Prepared Flooring—	Per square.		
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6	
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0	

PRICES CURRENT *Continued*).

WOOD.

Prepared Flooring—	Per square. £ s. d.	£ s. d.
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 13 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered. Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	- - -
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 0 0	9 5 0
" " galvanised	16 0 0	- -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	- - -
" " to 24 g.	10 15 0	- - -
" " to 26 g.	12 5 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	15 0 0	- - -
" " 22 g. and 24 g.	16 10 0	- - -
" " 26 g.	18 0 0	- - -
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 0 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	- - -
" " 22 g. and 24 g.	12 15 0	- - -
" " 26 g.	14 0 0	- - -
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0

(Under 3 in. usual trade extras.)

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 5 0	- - -
Pipe in coils	14 15 0	- - -
Soil pipe	17 5 0	- - -
Compo Pipe	17 5 0	- - -
ZINC—Sheet—		
Vieille Montagne ton	26 5 0	- - -
Silesian	26 0 0	- - -
COPPER—		
Strong Sheet per lb.	0 0 10½	- - -
Thin "	0 0 11½	- - -
Copper nails "	0 0 11	- - -
BRASS—		
Strong Sheet "	0 0 10	- - -
Thin "	0 0 11	- - -
TIN—English Ingots "	0 1 4	- - -
SOLDER—Plumbers' "	0 0 6	- -
Tinmen's "	0 0 8	-
Blowpipe "	0 0 9	

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
" fourths	2¾d. " "
21 oz. thirds	3¼d. " "
" fourths	3½d. " "
26 oz. thirds	4d. " "
" fourths	4¼d. " "
32 oz. thirds	5d. " "
" fourths	4½d. " "
Fluted sheet, 15 oz.	3d. " "
" 21 oz.	4d. " "
¼ Hartley's Rolled Plate	1¾d. " "
⅛ " " "	2d. " "
⅛ " " "	2½d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 1 11
" " " in drums	"	0 2 3
Boiled " " in pipes or barrels	"	0 2 2
" " " in drums	"	0 2 6
Turpentine, in barrels	"	0 3 2
" in drums	"	0 3 4
Genuine Ground English White Lead	per ton	20 0 0
Red Lead, Dry	"	20 0 0
Best Linseed Oil Putty	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

PRICES CURRENT (*Continued*).

VARNISHES, &c.

	Per gallon. £ s. d.
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Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 12 6
Superfine Hard-drying Oak, for Seats of Churches	0 10 0
Fine Elastic Carriage	0 14 0
Superfine Pale Elastic Carriage	0 12 6
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	0 18 0
Eggshell Flatting Varnish	1 1 0
White Copal Enamel	0 18 0
Extra Pale Paper	1 4 0
Best Japan Gold Size	0 12 0
Best Black Japan	0 10 6
Oak and Mahogany Stain	0 16 0
Brunswick Black	0 9 0
Berlin Black	0 8 6
Knotting	0 16 0
French and Brush Polish	0 10 0

TO CORRESPONDENTS.

H. W. (Below our limit). C. E. L. P. (Too late; next week).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

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All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

CAERPHILLY (Wales).—For the erection of an hotel, Aber, for the Glamorgan Public Trust Co., Ltd. Mr. H. Snell, architect, Stanwell-road, Penarth:—

Bowers & Co.	£6,105	T. F. Howells	£5,583
J. Howell	5,910	Rossiter & Sons	5,500
J. Jones	5,680	Evans Bros.	5,450
Allen & Son	5,650	W. Morgan, Cardiff*	5,350

CARSHALTON.—For villa residence, Rotherfield-road, Carshalton, Surrey. Mr. Chas. Botterill, architect, 583, Fulham-road, Walham Green, S.W.:—

Page & Son	£2,120	Cusden & Co.	£1,447
Akers & Co.	1,631	M. D. Wills	1,445
Edwards & Medway	1,520	S. J. Evans*	1,375

DARTMOUTH.—For the erection of four houses, Victoria-road. Mr. E. H. Back, C.E., architect, Dartmouth:—

Pillar & Row	£929 0 0
Wills & Anderson	878 7 6
Back & Watts	863 15 0
Ferris & Haydon, Stokefleming and Dartmouth*	828 17 6

FALMOUTH.—For the erection of conveniences near the Town Hall, for the Corporation. Mr. W. H. Tresidder, Borough Engineer:—

E. H. Moss, Falmouth* £153

FELIXSTOWE.—For the erection of a cottage residence for Dr. Wm. Elliston. Mr. G. W. Leighton, architect, Ipswich. Quantities by the architect:—

F. Thurman	£1,108 0 0
Ward & Son	1,059 10 0
Cubitt & Gotts	1,034 13 7
R. W. Pratt	992 7 6
H. J. Liegell	954 0 0
H. G. Knights	917 15 0
Parker Bros., Felixstowe*	869 6 2

[*See also next page.*

WALTHAMSTOW.—For road works, for the Urban District Council. Mr. G. W. Holmes, A.M.Inst.C.E., Town Hall, Walthamstow:—

Name of Road.	G. Bell.	G. Porter.	W. Griffiths & Co.	T. Free & Son.	A. W. Porter.	B. M. Glenny.	Surveyor.
	£	£ s.	£ s. d.	£	£ s.	£ s. d.	£ s. d.
Carlton-road	947	863 19	885 1 10	820	840 0	*812 13 9	880 10 3
Lancaster-road	632	559 5	567 1 6	551	—	*447 15 2	553 5 4
Oakfield-road	261	234 10	237 2 7	250	—	*200 13 6	235 0 0
Selwyn-avenue	913	930 10	925 13 8	866	849 0	*787 11 6	866 8 0
Wolsey-avenue	689	686 9	645 19 6	675	—	*564 0 2	609 9 9
Devonshire-road	801	739 7	826 5 0	716	698 10	*692 6 6	707 12 4
Paramatta-road	679	671 16	693 19 8	640	—	*589 8 10	565 5 4
Waverley-avenue	—	377 0	410 11 9	440	—	*302 0 0	330 3 5
Passages.							
Duke's Head	—	—	—	345	—	*355 7 6	338 16 8
Beulah	—	—	—	421	—	*471 0 0	426 4 1
Brandon-road (north side)	—	—	60 19 0	36	—	*65 9 0	54 15 8
,, (south side)	—	—	48 14 0	32	—	*49 1 6	43 11 2
Cuthbert (north side)	—	—	106 10 0	117	—	*120 9 0	90 18 2
,, (south side)	—	—	66 18 9	89	—	*74 19 6	61 13 8
Linford (north side)	—	—	68 12 6	75	—	*61 4 0	57 9 10
,, (south side)	—	—	61 15 6	44	—	*52 12 0	47 10 0

GLASGOW.—For the erection of University buildings, for the University Court. Mr. Jas. Miller, architect, 15, Blythewood-square, Glasgow:—

Masonry.—Muir & Sons, Glasgow	£42,937 15 2
Joinery.—Walker & Dick, Glasgow	13,336 14 9
Structural Steel-work.—Miller & Sommerville, Glasgow	1,025 6 1
Slating.—John Anderson, Glasgow	891 5 9
Plumbing.—Barton & Sons, Edinburgh	3,897 19 0
Plastering.—D. & J. Mackenzie, Glasgow	2,645 18 11
Tiling.—Galbraith & Winton, Glasgow	2,588 2 9

HEELEY, SHEFFIELD.—For two villa residences and conveniences in new road off Meersbrook Park-road, for Mr. George Hall. Messrs. Hall & Fenton, architects and surveyors, 14, St. James-row, Sheffield. Quantities by the architects:—

A. Bradbury	£1,322 0	T. Margerrison	£1,170 0
Bee & Son	1,284 10	M. Hancock	997 0
Martin & Hughes	1,295 0	G. Vaughan	900 0
H. Watkinson	1,212 0	M. A. Earl, Chesterfield-road*	875 0
Geo. Allen	1,210 0		
E. & W. Oxley	1,198 0		
Hy. White	1,193 10		

LONDON.—For pulling down and rebuilding entrance lodge, Hatcham, S.E., for Messrs. John Dicks. Mr. Delmé G. Mootham, architect, Effingham House, Strand, W.C.:—

Warren	£965 16 11	Snewin Bros.	£729 0 0
Lawrence	850 0 0	Andrews	683 0 0
Jarvis & Son	795 0 0	Wallis	660 0 0
Downes	737 0 0	Andrews	600 0 0

LONDON.—For certain pile-driving and underpinning work at the Cyclops Ironworks, Millwall, for Messrs. Edward Le Bas & Co. Mr. Chas. E. Gritton, A.M.Inst.C.E., Engineer, The Briars, Selhurst:—

F. & T. Thorne* £205

PAIGNTON.—For alterations and additions to the Curledge-street Board School, for the Paignton School Board. Mr. Frederick William Vanstone, architect, Paignton. Quantities by Mr. Vincent Cattermole Brown, Paignton:—

Webber & Sons	£1,968 0	N. Drew	£1,920 0
Maunder&Mudge	1,950 0	E. Westlake‡	1,885 10

‡ Accepted with modifications.

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